

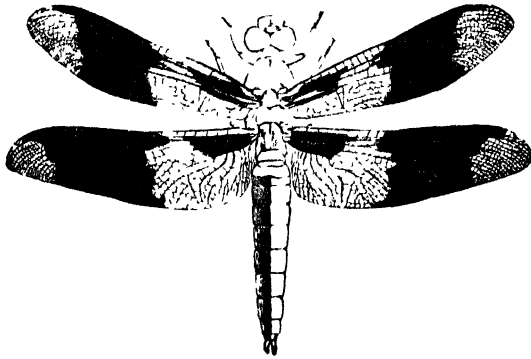


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LIBELLULA CRIMINALIS

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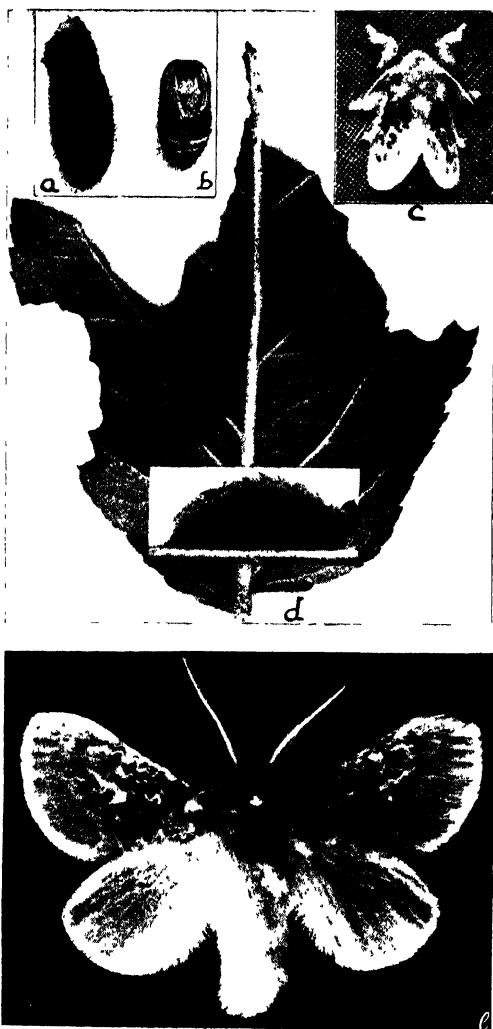
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THE CRINKLED FLANNEL MOTH, *MEGALOPYGE*
CRISPATA, PACKARD.

The Canadian Entomologist.

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NO. I.

THE CRINKLED FLANNEL MOTH (MEGALOPYGE CRISPATA, PACK.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

September 3rd, 1895, I received several nearly full-grown specimens of the curious, sluglike caterpillars of this beautiful moth, so aptly named by Professor Comstock, "the crinkled flannel moth." The cunning brown caterpillars were placed in a cage here at the insectary, where they fed freely on apple leaves, although they were feeding on quince when found at Worcester, Mass. Since Dr. Packard described the insect in its different stages in 1864, its life-history has been worked out in detail by Dr. Lintner (Ent. Contrib., II., p. 138, 1870), and recently by Dr. Packard (Proc. Am. Phil. Soc. for 1894, p. 275). In this last paper Dr. Packard has described and figured in detail the extra two pairs of abdominal legs (seven pairs in all) possessed by the caterpillars, and some curious lateral glandular processes.

It is now our practice here at the insectary to photograph, so far as possible, every stage, phase, and habit of any insect that we may study. It is not often, however, that we have as good a subject as the crinkled flannel moth proved to be. The main object of this note is to introduce some of the lifelike pictures we were able to secure of this interesting and beautiful insect.

As shown at *d* on the plate, three of the cunning little caterpillars posed for their photograph, which represents their natural size and brings out their characteristic appearance much better than any other figures we have seen. They spun their tough brown cocoons (represented natural size at *a* on the plate), with the tightly fitting and ingenious door at one end, on September 5th. Upon prying open the door of one cocoon, the male pupa (shown natural size at *b* on the plate) was revealed. As the cage was kept in our warm office, the development of the insect was doubtless abnormally accelerated, for on December 21st and 24th the pupæ pushed open the little doors, worked their way nearly out of the cocoon, and the moths emerged. We aimed our "Premo" at one of the

male moths as it was resting quietly and naturally on the muslin cover of the cage, with the result as shown at *c* on the plate. We were somewhat loath to kill such a pretty, daintily bedecked creature, but — well, he now fills an honoured place in our collection here at the University. Figure *c* on the plate well represents this pretty creature (twice natural size) as he now looks in the collection. Imagine the lighter portions of the figure to be of a delicate straw-yellow colour and the darker waves and crinkles of a rich brown shade, and you have a faint conception of this crinkled flannel moth.

I do not know that the insect has ever done enough damage to make it of economic importance. It certainly has a wide range of food plants, as shown by Mr. Beutenmuller (*Ent. Americana*, III., 180), who lists twenty-five different plants, and the cranberry has since been added in Massachusetts. Briefly stated, its life-history seems to be as follows: The eggs are laid about July 1, and hatch in a week or ten days; the caterpillars feed during July and August, pupating in September; some of the moths may emerge in the fall, but doubtless most of them hibernate as pupæ, the moths appearing in June and some laying their eggs.

TORONTO BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

It is with much gratification that we announce the formation of a branch of our Society in Toronto. In the month of February last a number of entomologists in Toronto, feeling their isolation and need of co-operation, met together and decided to form an organization for the promotion of the study of entomology. They accordingly established "The Toronto Entomological Society," with Mr. E. V. Rippon as President, and Mr. Arthur Gibson, Secretary. Regular meetings have been held on the first and third Fridays of each month, and recently a room has been engaged at 451 Parliament Street, where the books and collections are kept and the meetings held, and which is open at all times for the use of the members. For the last ten months the Society has been very successful and its members full of enthusiasm; much satisfactory work has been accomplished, and great pleasure has been derived by the members from meeting with kindred spirits, comparing specimens, discussing questions that arise from time to time, and giving and receiving much assistance in many ways.

Recently the desirability of affiliating with the old-established Entomological Society of Ontario was brought before the members, and after

full deliberation it was decided to become incorporated with it as a "Branch," in accordance with the terms of our Constitution. It will therefore be known, from the beginning of the New Year, as "The Toronto Branch of the Entomological Society of Ontario." It is hoped that every one interested in entomology, living in Toronto or the neighbourhood, will join the "Branch," and thus become members of our Society. The next meeting will be held on Friday evening, January 8th, at 8 o'clock, when visitors will be heartily welcomed.

The Montreal Branch has been in active operation for over twenty-three years, and held its 200th meeting a few months ago. We hope that in time to come the Toronto Branch may be able to boast of a similar record, and that each year as it goes by may find it growing and prospering, and doing good work for the furtherance of the science of entomology in the Dominion of Canada.

BREPHOS MIDDENDORFI, MEN.

On April 25th, 1896, I made a very lucky capture of a perfect specimen of this rare and beautiful moth. The afternoon being sunshiny and warm — one of our first spring days — I had gone out to look for beetles in a piece of wood along the Red River, a few miles from the city. This locality had proved rich in *Carabidae* in 1894, about the same date. Greatly to my disgust, I found the place transformed, all logs and "brush" having been cleared away the previous season, and hardly a beetle of any kind was to be found.

The moth in question was first seen to alight on the bank of a cutting leading down to the river; when disturbed from there by my investigations as to its identity, it flew up and down the roadway for a little while, and then hovered about some patches of mud, occasionally resting on the mud in the sunshine, very much after the manner of some of our butterflies. By this time I had got near enough to it to discover that it was something quite new to me, and my desire to capture it was therefore increased ten-fold. I had no net with me; in fact, I was only provided with a rather narrow-necked cyanide bottle for *Coleoptera* (the neck of my bottle was not an inch in diameter). That I was able, after several futile attempts, to get the mouth of the bottle down over it as it sat in the road, without damaging it in any way, was a matter of surprise at the time and congratulation whenever I have thought of it since. I certainly never made a more lucky capture. To Prof. John B. Smith I am indebted both for the identification and for his generosity in returning the specimen to me,

A. W. HANHAM, Winnipeg, Man.

ON THE MEXICAN BEES OF THE GENUS AUGOCHLORA.

BY T. D. A. COCKERELL, MESILLA, N. M.

The Mexican species of this beautiful genus may be readily separated by the following table :—

- A. Hind spur of hind tibia minutely ciliate or simple. = AUGOCHLORA, s. str.
1. Entirely copper colour, with tints of carmine. *flammea*, Sm.
 2. Head and thorax dark indigo blue, abdomen black with some green reflections. *nigrocyanea*, Ckll.
 3. Head and thorax green. 4.
 4. Abdomen black, size small *seminigra*, Ckll.
Abdomen crimson. *ignita*, Sm.
Abdomen green, without hair-bands. 5.
 5. Hind margins of abdominal segments broadly black; large blue-green species, with fuscous nervures *Binghami*, n. sp. ♂.
Hind margins of abdominal segments narrowly or not black; smaller, more yellowish-green species. 6.
 6. Small, wings dusky, nervures fuscous. *aurifera*, n. sp.
Medium size, nervures dull testaceous. 7.
 7. Face broad, emargination of eyes deep *labrosa*, Say.
Face narrow, emargination of eyes shallow. *pura*, Say.
- B. Hind spur of hind tibia pectinate. = AUGOCHLOROPSIS,
- subg. nov. (type, *subignita*).
1. Head and thorax black, abdomen ferruginous. *aspasia*, Sm.
Head and thorax green. 2.
 2. Abdomen crimson. *subignita*, Ckll.
Abdomen brassy, with dense short fulvous pubescence beyond basal segment. *aurora*, Sm.
Abdomen green, of the same colour as head and thorax, with two narrow bands of yellow pubescence. *splendida*, Sm.
- C. Hind spur of hind tibia not yet described.
1. Bright green, agreeing only with *splendida* in having abdominal hair-bands, but these are white. *viridana*, Sm.
 2. Small piceous species; margin of mesothorax, postscutellum, most of enclosure of metathorax, and bases of second and third abdominal segments shining green. *tisiphone*, Gribodo.

A. labrosa is cited from Mexico by its describer, but I have not seen it from that country. Mr. Robertson sends it to me from Illinois. There are two species found in Texas, which may be expected also across the

Mexican border. One of them is what passes for *A. sumptuosa*, Sm., in this country, and indeed agrees with Smith's description; but Col. Bingham finds that a co-type in the British Museum belongs to Section A above (spur minutely ciliate), while our insect belongs to Sect. B. It is just possible that the B. M. co-type is not identical with the true type of *sumptuosa*; if this is not so, our *sumptuosa* will have to be renamed. The other Texan species referred to was recorded by Cresson as *A. lucidula*, Sm., but it differs from that, and is referable to *A. humeralis*, Patton, of which it may perhaps constitute a geographical race. I have several specimens collected by Prof. C. H. T. Townsend at Beeville, Texas, Aug. 29, 1896, on a species of Compositæ. Col Bingham's studies at the British Museum show that *A. humeralis*, which belongs to Sect. B, cannot be identical with *A. ferruda*, Sm., as Robertson has supposed, since that belongs to Sect. A. Also, Patton was wrong in referring *lucidula*, Sm., which belongs to Sect. B, to *viridula*, Sm., which is of Sect. A. I will now describe the two new species indicated above:—

Augochlora Binghami, n. sp. (subg. *Augochlora*, s. str.)—¹. Length about 12 mm., brilliant bluish-green, the face a yellowish green. Face narrowing below, eyes deeply emarginate; sides of face with conspicuous, partly appressed, silky white pubescence; cheeks with long white hairs. Clypeus, supraclypeal area and middle of vertex with sparse, inconspicuous black hairs. Clypeus rather prominent, subcancellate with very large close punctures, its anterior margin and the upper half of the labrum whitish, mandibles wholly dark. Vertex finely and very closely punctured. Antennæ reaching to base of wings, piceous, flagellum obscurely rufescent beneath, last joint conspicuously hooked. Mesothorax shining, with very distinct rather small close punctures, much densest at the sides, where a minute cancellation results. Parapsidal grooves distinct. Prothoracic keel fairly strong. Enclosure of metathorax fairly well defined, irregularly wrinkled, its hind margin gently curved, not angled. Posterior truncation roughened, bounded below at sides by an acute ridge, which ascending rapidly fails. Pubescence of thorax sparse, grayish-white, black and inconspicuous on dorsum. Tegulæ shining piceous, anteriorly whitish, basally green and punctured. Wings smoky-hyaline, apical margin darker, stigma dull testaceous, nervures fuscous, marginal cell minutely appendiculate. Legs green with black tarsi, pubescence short and pale. Abdomen shining, closely punctured, hind margins of segments broadly

purplish-black. No hair-bands, but a very fine glittering pile all over, longer pale hairs at base of first segment, sparse black hairs on dorsum of hindmost segments and at tip. Punctuation of second segment conspicuously closer than that of first. Venter piceous, first three segments with blue reflections. End of third segment with a large dark brown brush of hair, shaped like the tail of a fish; *i. e.* deeply emarginate, the sides diverging and ending in a point.

Hab.—San Rafael, Vera Cruz, March 13, on flowers of plant No. 4, which is papilionaceous (C. H. T. Townsend).

This beautiful species is named after Lt.-Col. Bingham, without whose notes on the British Museum types I should not have attempted this paper.

Augochlora aurifera, n. sp. (subg. *Augochlora*, s. str.)—♀. Length about $7\frac{1}{2}$ mm, green; head and thorax dullish, rather a bluish-green; abdomen shining, a yellower green, with the hind margins of the segments very narrowly coppery. Face fairly broad, emargination of eyes deep. Pubescence of head and thorax sparse and inconspicuous, dirty whitish, some black hairs on thoracic dorsum; lower part of face in certain lights canescent. Clypeus with close punctures of unequal size, supraclypeal area more finely punctured, vertex coarsely granular. Labrum and margin of clypeus black. Mandibles notched within, stout, rufescent medially. Glossa very long and narrow, coming to a fine point. Antennæ black, flagellum slightly rufescent beneath. Mesothorax very closely, finely, and uniformly punctured. Enclosure of metathorax conspicuously longitudinally, or rather radiately, sulcatulate. Truncation shining, finely malleate, with a median groove. Tegulæ shining piceous, the margin subhyaline. Wings smoky, stigma dull testaceous, nervures fuscous, marginal cell appendiculate. Legs piceous-black, with brownish pubescence; only the anterior femora show any green. Abdomen shining, with minute, not very close, punctures; pubescence very sparse, no hair-bands. It requires a strong lens to see the abdominal punctures.

Hab.—San Rafael, Vera Cruz, March 9, on flowers of plant No. 6, referred by Dr. Rose to the genus *Melopodium*. The hind legs, base of thorax and abdomen, and ventral surface of abdomen, carry considerable quantities of the orange pollen. Another specimen differs by being much bluer, the punctuation a little coarser, the stigma fuscous; but it is evidently the same species. It is from San Rafael, March 14, on flowers of plant No. 5, a *Vernonia*. Both were collected by Prof. C. H. T. Townsend.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XIX. THE CHRYSOMELIDÆ OF ONTARIO AND QUÉBEC - (*Continued*).

TRIBE IX. —GALERUCINI.

This tribes includes a number of species which are, as a rule, easily distinguished by the peculiar appearance given by their soft integuments and usually somewhat elongate form. A number of them are pubescent, while others, on account of the peculiar sculpture of the surface, are quite opaque, the effect on the eye being, at first glance, the same in each case. The elytra in our species are longer than the abdomen, the prothorax is margined, the antennæ approximate, inserted on the front, the hind legs with rather slender thighs, not fitted for leaping. It will be remembered in this connection that I consider the Halticini as a distinct tribe.

Many of the Galerucini are extremely injurious, the striped cucumber beetle being well known and dreaded by gardeners; its congener, *Diabrotica longicornis*, which has lately been found by Mr. Harrington in the Eastern Provinces, is a notorious pest to corn in the United States. In the Northeastern States the imported elm-leaf beetle, *Galerucella xanthomelena*, Schr., is doing much mischief, but I cannot find that it is reported from Canada. If found, it may be distinguished from all our other species of *Galerucella* by the colour of the antennæ, which are piceous above and pale beneath, while the elytra are comparatively finely and equally punctate. It is yellowish above, the head with one dark spot, the thorax with three, the elytra with a short inner stripe (sometimes wanting), and a long one from the humerus; legs pale, each femur with a small dark spot.

The tribe has recently been worked up in an excellent paper by Dr. Horn, and this has been closely followed and freely used in the preparation of the following pages. In order to avoid the constant repetition of quotation marks and statements of acknowledgments, it is well to say that the differential characters brought out are in almost every case those used by the Doctor, and that while I have not scrupled to change the arrangement of his tables where it seemed to me more likely to serve the purpose of the present article, I have, on the other hand, found it impossible to improve on most of his expressions, and have therefore used them entire. With this acknowledgment of the source of whatever is good in the paper, we may proceed to separate the genera occurring in Canada, thus:—

- A. Anterior coxal cavities open behind.
- b. Claws simple or bifid.
- c. Tibiæ without terminal spurs; epipleura of elytra extending nearly to apices.
- d. Antennæ longer than one half the body; claws deeply bifid.
Third antennal joint shorter than fourth; large
species *Trirhabda*.
Third joint longer than fourth; small
species *Galerucella*.
- dd. Antennæ less than half as long as body; claws simple or
narrowly bifid *Monoxia*.
- cc. Tibiæ (middle and posterior) with terminal spurs, outer edge
more or less carinate *Diabrotica*.
- bb. Claws appendiculate (*i. e.* with broad dilatation at base).
Epipleura not distinct, tibiæ without spurs *Phyllobrotica*.
Epipleura distinct, all the tibiæ with spurs *Luperodes*.
- AA. Anterior coxal cavities closed behind.
- Large species, tarsal claws bifid, tibiæ without spurs... *Galeruca*.
Smaller species, claws appendiculate, tibiæ with spurs... *Cerotoma*.
- I have omitted *Scelolyperus* from the above table, although the Southern Californian *S. maculicollis*, Lec., is in the Society list. The genus belongs in the group with open anterior coxal cavities, appendiculate claws and well-defined epipleura. In the scheme it would precede *Luperodes*, from which it differs in having no tibial spurs. The species above mentioned is about one-fourth of an inch in length, head and under surface black, thorax either yellow with three dark spots or entirely black, elytra bluish or greenish. Antennæ two-thirds as long as the body, piceous, with three basal joints pale beneath.

TRIRHABDA, Lec.

Large insects, of rather elongate-oblong form, usually of somewhat opaque surface, the thorax in most cases spotted, the elytra bluish, greenish, or brownish, with yellowish stripes. They are to be taken during the summer months by sweeping rank herbage in lanes and meadows, and may often be taken in numbers on the golden-rod. Dr. Horn has thus separated our species:

- A. Surface of body without any trace of metallic lustre in the markings, these being opaque or brownish.

- b. Elytral punctures so dense as to be indistinct as such.
 Yellow vittæ of elytra attenuate to apex. .30-.40
 in..... *to mentosa*, Linn.
 Yellow vittæ broad, parallel and entire. .28-.38
 in..... *canadensis*, Kby.
- bb. Elytral punctures dense, but distinctly separate. Elytra normally vittate as in *canadensis*. .26-.36 in..... *virgata*, Lec.
- AA. Surface of body with metallic lustre ; if not in the markings of the elytra, at least on those of the head and thorax. Punctuation of elytra comparatively rough.
 Elytra entirely blue, except border. .20-.32
 in..... *flavolimbata*, Mann.
 Elytra with outer border and discal vitta yellow.
 .20-.28 in..... *convergens*, Lec.

GALERUCILLA, Crotch.

This genus, as now understood, contains species formerly distributed partially in *Adimonia* and partially in *Galeruca*. Many of them are quite common, and are to be found in the sweepings of meadows, on water lilies, *Sagittaria*, *Eupatorium*, or occasionally on the leaves of deciduous trees, as in the case of *G. caricollis*, which I have taken abundantly on wild cherry. All but three of the North American species have been recorded from Canada, and Dr. Horn's table is here reproduced almost in full, though some portions are transposed, and the remainder made to include the non-vittate specimens of *G. americana*, so as to render identification a trifle more easy when reference cannot be had to detailed descriptions. The limit of variation in some of the vittate forms is very wide, and has resulted in the multiplication of nominal species. It is believed that the table will now cover any cases likely to be met with in the Provinces of Ontario and Quebec. In case of the occurrence there of the elm-leaf beetle, a reference to the first page of this article will result in its proper identification.

A. Colour red.

- Elytra more coarsely punctured, intervals between punctures distinct, surface shining. .18-.22 in..... *caricollis*, Lec.
 Elytra finely and densely punctured, surface rather opaque.
 .18-.22 in..... *rufosanguinea*, Say.
- AA. Colour yellowish, brownish or piceous, elytra vittate or not.
- b. Elytra normally vittate.

- c. Elytra scarcely explanate at sides, middle coxæ separated.
 Elytra convex, coarsely punctate; thorax more or less shining, spotted indistinctly if at all. .14-.26
 in *americana*, Fabr.
 Elytra less convex, more closely and less coarsely punctate, thorax opaque with three spots. .20-.24
 in *sexvittata*, Lec.
- cc. Elytra distinctly explanate, middle coxæ contiguous.
 Sutural vitta joined by next at or behind the middle. .14-.20 in *notulata*, Fabr.
 Vitta next to the sutural very short, basal. .14-.20
 in *notata*, Fabr.
- bb. Elytra not vittate, often with lighter side margin.
- d. Form convex, elytra coarsely punctate... *americana*, var.
- dd. Form not notably convex.
- e. Middle coxæ separated, thorax angulate at middle, subsinuate behind, hind angles obtuse. .18-.24
 in *nymphææ*, Linn.
- ee. Middle coxæ contiguous, hind angles of thorax distinct.
 Thorax coarsely, not very closely, punctate. *notulata*, var.
 Thorax densely punctured and opaque. .18-.22
 in *decora*, Say.

MONOXIA, Lec.

M. consputa, Lec. (*guttulata*), has been recorded on the Society's list. It is a small insect, .14-.18 in. long, of a somewhat oblong form, resembling some *Galerucellæ*, but with shorter antennæ; yellowish or reddish-yellow in colour, elytra often with numerous very small black spots. It is common on the plains to the westward, but I have seen no specimens from Ontario or Quebec, and it is just possible that an immaculate specimen of *Galerucella notulata* has been mistaken for it.

DIABROTICA, Chev.

Here belongs the striped cucumber beetle (*D. vittata*, Fabr., Fig. 1), so common on and often injurious to cucumber and squash vines. It is a little less than one-fourth of an inch in length, yellow above; head, scutellum, and three elytral stripes (one common sutural, one discal on each wing-cover) black. Basal joints of antennæ partially yellowish, legs with dark tarsi and knees, front tibiæ and tips of middle and hind tibiæ also



FIG. 1.

dark. The twelve-spotted *Diabrotica*, *D. 12-punctata*, Fabr. (Fig. 2), in life is pale greenish above, turning to yellowish in old cabinet specimens; antennæ dark, with three basal joints pale, head black, scutellum dark, each elytron with six black spots. Legs dark, basal half of femora pale. Size a little greater than the preceding. Mr. Harrington has recently found *D. longicornis*, Say, in the Eastern Provinces. It may easily be distinguished by its smaller size and immaculate green, fading to yellowish, elytra.



FIG. 2.

PHYLLOBROTICA, Chev.

These are very pretty insects, marked with yellow and black. Two have been recorded from Canada, but as there is a chance of error in determination I herewith include *limbata* as well, since its other recorded distribution seems to indicate a more northern range than is found in *discoidea*. All three have yellow head and thorax. Dr. Horn thus defines them:

Elytra yellow, with two oval piceous spots on each (Fig. 3), .22-.28 in. *decorata*, Say.

Elytra piceous, sides and suture yellow.

Thorax with moderately deep fovea each side. .14-.26 in. *discoidea*, Fabr.

Thorax with transverse depression. .14-.26 in. *limbata*, Fabr.

LUPERODES, Motsch.

Contains one Canadian species, *L. merac.*, Say, an elongate insect, .20 in. long, dark blue or blue-black above, piceous beneath, thorax nearly equal in length and breadth, hind angles acute and prominent, disk convex, smooth, elytra sparsely punctate. Legs yellow, basal half of femora piceous. It has been reported by Mr. Chittenden as feeding on the witch-hazel, while on another occasion he found it in great numbers on the flowers of the wild rose, the petals of which served as food.

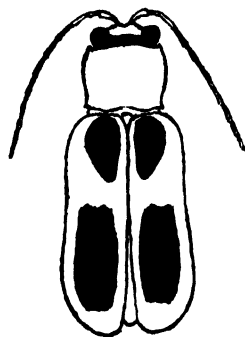


FIG. 3.

GALERUCA, Geoff.

G. externa, Say, represents the genus in North America, and while commoner to the eastward, has been reported from Canada. It is a robust insect, easily known from our other Galerucini by the large size (.27-.44 in.) and broadly oval form. The colour is blackish, outer margin

of elytra yellowish, upper surface coarsely and closely punctate. Elytra with four more or less well-marked costæ. The food-plant of this beetle is still unknown to me, for, while I have collected a great many specimens, they were always found under logs or stones.

CEROTOMA, Chevr.

Represented by *C. trifurcata*, Forst. (*caminca*, Fabr.), resembling somewhat the common *Diabrotica 12-punctata* in form, but shorter. Head and under side of body black, upper surface of thorax and elytra yellowish or occasionally red. Elytra marked with black, as shown in fig. 4, this pattern being often reduced or added to by the greater or less extension of the yellow. Length, .14-.20 inch. Mr. Chittenden records the bush-clover, *Lespedeza*, as a food plant, and remarks that legumes form the chief food of the species. My own captures have been, for the most part, made by overturning boards and chips in patches of meadow land during the middle of spring.



FIG. 4.

A GENERIC REVISION OF THE HYPOGYMNIDÆ (LIPARIDÆ).

BY HARRISON G. DYAR, NEW YORK.

Before the generic names of our moths can become permanent, it is necessary that all the described genera should be compared, but specially the older genera of Europe. To make a beginning in this matter, I have drawn up the following synoptic table of the Hypogymnidæ, based on the characters used in Hampson's Moths of India, adding thereto the species found in Europe and in North America. The types of the genera are recognized as determined by Kirby.

Probably but few, if any, changes will be necessary from this list, as the African and South American species for the most part belong to other genera, or else have later dates than the generic names here defined.

I exclude two genera given by Hampson, viz.: *Retarda* and *Thiacidas*. The latter seems to me to be a Noctuid, perhaps one of the *Apatelidæ*, while the former has the venation of the *Tineides* and is without frenulum; it probably represents a new family type.

In the *Tentamen*, Hübner gives the three plural terms, *Hypogymnæ*, *Leucomæ*, and *Dasychiræ*, all referring to this family. As these appear to be the first plural terms, one of them must stand for the family. The

term Liparidæ as used by Herrich-Schaffer, Kirby, etc., and the Lymantriidæ of Hampson cannot stand. Grote at first used Dasychiræ, as in his list of 1882. Later he selected Leucomidæ (Syst. Lep. Hild., 1895), and finally Hypogymnidæ (Syst. der Nord. Schmett., 1896). Dasychiridæ is unavailable as the generic term becomes synonymous, and the first of Hubner's terms may best be retained.

Two new generic terms seem necessary. The two European species of *Ocneria* are not congeneric, as one has two pairs of spurs on the hind tibiæ and the other but one. The latter may be separated under the term *Parocneria*, type *detrita*, Esp. The same is the case with our species of *Notolophus*. All the European species which I have seen, and our *antiqua* and *vetusta*, have one pair of spurs, as stated by Hampson. The larvæ have black heads. Two other species, *leucostigma* and *definita*, have two pairs of spurs, and may be called *Hemerocampa*. The larvæ have pale heads.

I add to the synopsis a partial list of species. Kirby and Hampson may be consulted for details, and for the genera not specifically mentioned.

1. Primaries with vein 10 from the accessory cell 2.
 Primaries with vein 10 from beyond the accessory cell . . . *Mardara*.
 Primaries without accessory cell, or rarely with one with vein 10
 before the accessory cell or joined to vein 11 12.
2. Palpi porrect 3.
 Palpi upturned 11.
3. Hind tibiæ with no spurs *Varmina*.
 Hind tibiæ with one pair of spurs 4.
 Hind tibiæ with two pairs of spurs 6.
4. Female with well-developed wings 5.
 Female with the wings useless, largely aborted . . . *Hypogymna* (2).
 Female with aborted wings *Notolophus* (3).
5. Robust, the palpi not or but slightly exceeding the
 front *Gynaephora* (1).
 Fragile with small body, the palpi considerably exceeding
 the front *Pantana*.
6. Primaries short and broad 7.
 Primaries more produced 9.
7. Female with well developed wings 8.
 Female with aborted wings *Hemerocampa* (7).

-
8. Fore tarsi with lateral tufts of hair on the joints..... *Cifuna*.
 Fore tarsi without these tufts..... *Aroa*.
9. Fore tarsi smooth haired ; palpi long..... *Laelia* (4).
 Fore tarsi more roughly haired or tufted..... 10.
10. Palpi not reaching beyond the front..... *Orgyia* (5).
 Palpi reaching beyond the front..... *Olene* (6).
11. Palpi slight, closely approximated to the front and not
 reaching the vertex..... *Daplasa*.
 Palpi reaching the vertex..... *Numenes*.
 Palpi reaching above the vertex..... *Pida*.
12. Primaries with veins 7 to 10 stalked..... 13.
 Primaries with veins 8 to 10 stalked..... 23.
 Primaries with vein 10 from the cell, or rarely stalked with 11.... 24.
13. Palpi upturned..... 14.
 Palpi porrect..... 17.
14. Primaries with the apex rounded..... 15.
 Primaries with the apex acute..... *Topomesa*.
15. Primaries with vein 10 given off near the apex..... *Heracula*.
 Primaries with vein 10 given off nearer the cell than vein 7.... 16.
16. Female with well developed wings..... *Lymantria* (8).
 Female with aborted wings..... *Enome* (9).
17. Posterior tibiæ with two pairs of spurs..... 18.
 Posterior tibiæ with one pair of spurs..... 21.
18. Palpi short..... 19.
 Palpi long..... 22.
19. Vein 5 of secondaries absent..... *Leucoma* (12).
 Vein 5 of secondaries present..... 20.
20. Primaries with vein 10 given off near the apex..... *Euproctis* (13).
 Primaries with vein 10 nearer the cell, or with vein 7..... *Cispia*.
21. Palpi very minute..... *Perina*.
 Palpi rather long..... *Parocneria* (10).
22. Antennæ of female with long pectinations..... *Imaus*.
 Antennæ of the female with short pectinations..... *Ocneria* (11).
23. Vein 5 of secondaries near lower angle of cell ; palpi
 very long..... *Dactylorhyncha*.
 Vein 5 near upper angle of cell ; veins 3 and 4 united.... *Gazelina*.
24. Palpi porrect..... 25.
 Palpi upturned..... *Arctornis* (14).

25. Palpi long ; hind tibiæ with two pairs of spurs *Himala*.
 Palpi short ; hind tibiæ with one pair of spurs 26.
 26. Secondaries with veinlets between vein 1 and margin . . *Dendrophelps*.
 Secondaries without supplementary veinlets *Stulpnotia* (15).

1. Genus GYNÆPHORA, Hübner.

Type *selenitica*, Esp. Also, *ladacensis*, Moore (Hampson I., 435, as Lachana); *rossii*, Curt., and probably *groenlandica*, Hom., which I have not seen.

2. Genus HYPOGYMNA, Hubner.

Type *morio*, Linn.

3. Genus NOTOLOPHUS, Germ.

Type *antiqua*, Linn. Also, *gonostigma*, Linn.; *ericæ*, Germ.; *postica*, Walk.; *viridescens*, Walk.; *turbata*, Butl.; *vetusta*, Boisd.; *cana*, Hy. Edw.; *gulosa*, Hy. Edw.

4. Genus LAELIA, Stephens.

Type *coenosa*, Hubn. Also 12 Indian species.

5. Genus ORGYIA, Ochs. (= *Dasychira*, Hubn.)

Type *fascellina*, L. Also *pudibunda*, L.

6. Genus OLENE, Hubn. (= *Dasychira*, Hampson *Parorgyia*, Packard).

Type *mendosa*, Hubn. Also *abietis*, Den. & Sch.; *cinnamomea*, G. R.; *achatina*, A. S.; *leucophæa*, A. S.; *plagiata*, Walk.; and 18 Indian species.

7. Genus HEMEROCAMPA, Dyar.

Type *leucostigma*, A. S. Also *definita*, Pack.

8. Genus LYMANTRIA, Hubn.

Type *monacha*, L. Also *dispar*, L., and 14 species from India.

9. Genus ENOME, Walk.

Type *ampla*, Walk. Also ten other Indian species. Hampson makes this a section of *Lymantria*, but I regard it as a higher group.

10. Genus PAROCNERIA, Dyar.

Type *detrita*, Esp.

11. Genus OCNERIA, Hübner.

Type *rubea*, Fab.

12. Genus LEUCOMA, Hubn., Tent. (= *Porthesia*, Steph.)

Type *similis*, Fuessl. Also two Indian species.

13. Genus EUPROCTIS, Hübn. (= *Artaxa*, Wlk.)
Type *chrysorrhæa*, L. Also fifty-three Indian species. See
Hampson for the generic synonymy.
14. Genus ARCTORNIS, Germ. (= || *Leucoma*, Steph. = || *Laria*, Schr.)
Type *L-nigrum*, Müll. Also eight Indian species.
15. Genus STILPNOTIA, Westw. & Hump. (= *Leucosia*, Ramb. = *Charala*,
Moore = *Caragola* Moore = *Nymphyxis*, Grote.)
Type *salicis*, Linn. Also six Indian species listed under *Caviria*,
Walk., which, however, is a South American genus, and not
strictly congeneric with the Indian forms.

CATALOGUE OF THE PHYTOPHAGOUS AND PARASITIC
HYMENOPTERA OF VANCOUVER ISLAND.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The following list is based upon a very interesting collection made, chiefly at Cedar Hill, near Victoria, by the Rev. G. W. Taylor, F.R.S.C., but includes such other species as I have found described, or recorded from Vancouver Island. Even with such additions it is a short list in comparison with those that could be compiled from much less extensive areas in Ontario. British Columbia has, as yet, had but few resident entomologists, and its rich fauna is, in consequence, but poorly known. Butterflies and beetles have been fairly well collected, but in other directions there are almost unexplored fields for investigation.

I have found but little literature relating to the Hymenoptera of Vancouver Island, and but scanty records of species captured there. Lord, in his interesting narrative of a Naturalist in British Columbia, has an appendix enumerating the insects secured by him, with descriptions of a few new species. Cresson, in a paper entitled Descriptions of Ichneumonidæ, chiefly from the Pacific Slope of the United States and British North America (Proc. Acad. Nat. Sci., Phil.; Nov., 1878), described about twenty-five species from the Island, contained in the collections of the late distinguished entomologists, Mr. H. Edwards and Mr. Crotch. The late Abbé Provancher described a few species in the CANADIAN ENTOMOLOGIST (Vol. XVII., p. 114), and in the Additions to his Petite Faune Entomologique du Canada credits the Island with some thirty-five species, mostly new forms contributed by Mr. Taylor and Mr. Fletcher. The types of some of those species are now in my collection, through Mr. Fletcher's kindness, and have been found very useful for comparison.

Kirby, in his List of the Hymenoptera in the British Museum, records several species of Tenthredinidæ and Uroceridæ. To Mr. Taylor, however, is due a large proportion of our knowledge of the Hymenopterous fauna. In Vol. XVI. and XVII. he published a list of eighty one species, from the vicinity of Victoria, and he continued to collect there and sent specimens to Mr. Fletcher and myself until he came to reside in Ottawa a few years ago. He then brought his collection with him to this city, and on his return to the Pacific Coast he placed all the remaining Hymenoptera in my hands, on the condition that I should prepare a list of them for publication, in revision and enlargement of his own earlier list, in which there are some errors in determination.

The collection has proved to be a most interesting one, and to contain quite a number of new insects. It is, as might be expected, deficient in the smaller forms, such as Cynipidæ, Braconidæ, Chalcididæ, and Proctotrypidæ. As time has permitted, I have proceeded with the determination of these insects, and have published descriptions (CAN. ENT., Vol. XXVI.) of some new species. The Aculeata require further study, especially such genera as *Andrena*, *Halictus*, *Osmia*, etc., before a satisfactory list can be made of them. Mr. Taylor is now resident at Nanaimo, and it is to be hoped that his duties will afford him opportunity to collect in that district. The publication of a list (even though imperfect) of the recorded species may perhaps stimulate others to join with him in a more systematic collection of the Hymenoptera of Vancouver Island, which offers so rich a field for study. The fauna is evidently a very extensive one, containing many species occurring in the Pacific States, while in the northern portion of the Island and on the mountains there should be a large intermingling of species inhabiting Alaska and the Rocky Mountains. It would not require much effort to increase many-fold the number of species at present known. The order Hymenoptera is so rich in species, and the conditions of the occurrence of the species are so varied, that it will long be possible to discover forms new to science, even in Ontario, where the fauna is so much better known. In the vast and diversified regions of the Pacific Slope, such new and undescribed species must be almost unlimited.

TENTHREDINIDÆ.

Trichiosoma Taylori, *Prov.*—Common on the Island and throughout B.

C. I took it at New Westminster, and have examples from Tacoma (Wickham) and the Rocky Mountains (Bean). Probably only a

Western form of *T. triangulum*, under which name Taylor records it. Cocoons very frequently parasitized.

Trichiosoma vittellina, Linn.—Kirby (*List Hym. Brit. Musm., Vol. I., p. 10*) records a ♂ of this European species from the Island (Dr. Lyall) and a ♀ from the Rocky Mountains. Perhaps all our forms belong to one boreal species. They certainly do not vary so much as the insects included in *Cimbex americana*.

Abia Kennicotti, Nort.—One ♀ received by Mr. Fletcher, dated 4th June.

Hylotoma McLeayi, Leach.—One ♀ received by Mr. Fletcher, dated 2nd June.

Euura sp.—Two specimens in condition not favorable for determination.

Cladius pectinicornis, Fourc; *Cladius isomera*, Harris.—One ♀ from Mr. Wickham.

Pontania nevadensis, Cress. (*Nematus*).—Marlatt; Rev. N. A. Nematinae, p. 30.

Pteronus mendicus, Walsh (*Nematus*).—Two ♀ received by Mr. Fletcher; also one ♀ from Mr. Wickham.

Pteronus vancouverensis, Marlatt.—Rev. N. A. Nematinae, p. 70.

Pachynematus coloradensis, Marlatt.—One ♀ received by Mr. Fletcher.

Pachynematus palliventris, Cress. (*Nematus*).—One ♀ received by Mr. Fletcher apparently belongs to this species.

Dolerus collaris, Say.—One ♀.

Dolerus sericeus, Say.—Eight ♀, seven ♂; a very common species, generally more robust and pubescent than Ottawa examples.

Monophadnus atratus, Hargtn.—Type ♂ in my coll.

Phymatocera nigra, Hargtn.—One ♂. April.

Hoplocampa halcyon, Nort.—Taylor; CAN. ENT., Vol. XVI., p. 92.

Labidia opimus, Cress.

Allantus opimus, Cr.; *Labidia columbiana*, Prov.—Originally described from V. I. collection of Crotch; redescribed from Taylor's collection. Appears to be common. Four ♀, four ♂. The *A. originalis* of Taylor's list, and probably identical with that species.

Allantus elegantulus, Cress.—Five ♀, one ♂; June. Also to Fletcher, four ♀, two ♂; labelled May and June.

Taxonus parens, Prov.—Type ♂ in my coll. Probably the ♂ of *Strongylogaster rubripes*, Cress., from Col.

Strongylogaster distans, *Nort.*—Common in April and May. I have eight ♀ and six ♂ specimens, and Mr. Fletcher has six ♀ s. The abdomen of the male is entirely red, except base of first segment and basal plates, but the female has the remaining segments more or less marked with basal black spots.

Strongylogaster (?) *marginata*, *Prov.*

Sclandria marginata, *Prov.*—Type ♀ in my coll. Mr. Fletcher has also six ♀ and four ♂ from Cedar Hill. May and June.

Tenthredo erythromera, *Prov.*—Type ♀ in my coll.

Tenthredo nigrisoma, *Hargtn.*—Types ♀ in my coll. One taken by Taylor, 5th June, 1888; the other, also at Victoria, by Wickham.

Tenthredo nigricosta, *Prov.* Type ♀ in my coll.

Tenthredo rubricus, *Prov.*

Allantus rubricus, *Prov.*—Type ♀ and another in my coll.; one also examined for Mr. Fletcher. The antennæ are not those of an *Allantus*, and the insect is apparently a variety of *T. mellina*, with antennæ slightly shorter and pale markings less conspicuous.

Tenthredo ruficoxa, *Prov.* Type ♀ in my coll.

Tenthredo rufopedibus, *Nort.*—Recorded by Taylor as common in spring, but not in his collection; probably the species I have determined as *T. variata*.

Tenthredo terminalis, *Prov.*—Type ♀ in my coll.

Tenthredo variata, *Nort.*—Three ♂ specimens. May and June. Mr. Fletcher has also one ♂.

Tenthredo varipicta, *Cress.*—*Prov.*; *Add. Faune Hym.*, p. 14. Two females taken 28th May and 4th June, received by Mr. Fletcher.

Tenthredopsis Evansii, *Hargtn.*—Mr. Fletcher has one ♂ taken in May.

Synairema pacifica, *Prov.*—Type ♀ in my coll. Apparently a species of *Macrophya*; the coxæ are shorter than usual, but the femora reach to tip of abdomen. Head coarsely punctured; in shape and sculpture resembling *Macrophya*; antennæ wanting. Thorax coarsely but more sparsely punctured, and scutellum polished, with a few shallow punctures. Appears to be closely related to *M. bicolor*, *Cress.*, but has first segment black.

Pamphilus pacificus, *Nort.*—Kirby; *List Hym. Brit. Musm.*, Vol. I., p. 348.

Macroxyela, sp. nov.? One ♀ labelled as captured on oak. May 12th, 1896.

URO CERIDÆ.

Urocerus abdominalis, *Harris*.—Two specimens; probably males of *albicornis* or *flavicornis*.

Urocerus albicornis, *Fabr.*—One ♀.

Urocerus apicalis, *Kirby*.—*List Hym. Brit. Musm., Vol. I., p. 377, ♂*; probably the male of *cæruleus*

Urocerus cæruleus, *Cress.*—♀ described from V. I. coll., H. Edw. Mr. Fletcher has taken it at New Westminster, B. C.

Urocerus caudatus, *Cress.*—One ♀ and one ♂.

Urocerus cyaneus, *Fabr.*—One ♀.

Urocerus flavicornis, *Fabr.*—One ♀. Recorded by Taylor as "common in autumn."

Urocerus flavipennis, *Kirby*.—Five ♀. A large, handsome insect, but probably a form of *albicornis*.

Urocerus Morrisoni, *Cress.*—One ♀. This is doubtless a *var.* of *caudatus*.

Urocerus varipes, *Smith.*—One ♀. Very close to *cyaneus*.

ORYSSIDÆ.

Oryssus Sayi, *Westw.*—One ♀. Also a ♂ of *var. occidentalis*, *Cress.*

CYNIPIDÆ.

Ibalia ensiger, *Nort.*—One ♀ received by Mr. Fletcher.

Onchyia Provancheri, *Ashm.*—One ♀; 4th June.

EVANIIDÆ.

Aulacus pacificus, *Cress.*—♀ described from V. I. coll., Crotch.

ICHNEUMONIDÆ.

Ichneumon atrox, *Cress.*—One ♀; 6th June. Also one ♀ to Mr. Fletcher.

Ichneumon cæruleus, *Cress.*—Taylor; CAN. ENT., Vol. XVI., p. 91. One ♀ to Mr. Fletcher.

Ichneumon cestus, *Cress.*—Three ♀. Species was described from V. I. coll., H. Edw. A common species, easily recognized by single black band on abdomen. Mr. Fletcher has numerous examples from Mr. Danby.

Ichneumon compar, *Cress.*—♀ described from V. I. coll., H. Edw.

Ichneumon creperus, *Cress.*—Three ♂.

Ichneumon difficilis, *Cress.*—This insect was described from Cal., but a *var.?* is noted from V. I. coll., H. Edw.

Ichneumon inconstans, *Cress.?*—One ♂.

- Ichneumon infucatus*, *Cress.*—Cat. Hym. N. Am., p. 185. One ♂ received by Mr. Fletcher.
- Ichneumon insolens*, *Cress.*—Taylor, *loc. cit.*: "One specimen bred from chrysalis of *Vanessa antiopa*."
- Ichneumon lividulus*, *Prov.*—One ♀ received by Mr. Fletcher, labelled *Ich. grandis*, determined by Mr. Brodie. Seems, from the partially rufous legs, etc., to belong rather to this species.
- Ichneumon longulus*, *Cress.*—Taylor, *loc. cit.* A specimen so labelled, received by Mr. Fletcher, is, however, only the ♂ of *cestus*, varying a little from typical coloration.
- Ichneumon nuncius*, *Cress.*—Three ♂s; also four received by Mr. Fletcher.
- Ichneumon occidentalis*, *Hargtn.*—Type ♀ in my collection.
- Ichneumon otiosus*, *Say.*—Taylor, *loc. cit.*: "My only specimen was unfortunately destroyed during the process of examination."
- Ichneumon rufiventris*, *Brullé.*—One ♀ labelled *insolens* apparently belongs to this species.
- Ichneumon russatus*, *Cress.*—Two ♀s. Type was from V. I. coll., H. Edw.
- Ichneumon sagus*, *Cress.*—One ♀ received by Mr. Fletcher.
- Ichneumon salvus*, *Cress.*—The ♂ was described from V. I. coll., H. Edw.
- Ichneumon scibilis*, *Cress.* One ♂.
- Ichneumon seminiger*, *Cress.*—Taylor, *loc. cit.* Not seen.
- Ichneumon sequax*, *Cress.*—Type ♀ was from V. I. coll., H. Edw. Taylor (*loc. cit.*) says: "Very common; one specimen was bred from the chrysalis of a *Lycæna*."
- Ichneumon Taylora*, *Hargtn.*—Type ♀ in my collection.
- Ichneumon vancouverensis*, *Prov.*—Type ♂ was from coll. Taylor, who says (*loc. cit.*), "This fine insect is abundant, and I have bred it in some numbers from the pupa of a *Bombyx*." Not seen, but answers to description of *neutralis*, Cr., from Cal.
- Ichneumon variegatus*, *Cress.*—One ♂ to Mr. Fletcher.
- Hoplismenus pacificus*, *Cress.*—♀ ♂ described from V. I. coll., H. Edw.
- Amblyteles hudsonicus*, *Cress.*—Two ♀s. One of these is a *var.* with the head and thorax above rufous. Mr. Fletcher also has one ♀.
- Amblyteles nubivagus*, *Cress.?*—One ♂ *var.?* .
- Amblyteles perluctuosus*, *Prov.*—One ♀.

(TO BE CONTINUED.)

BOOK NOTICES.

Rules for regulating nomenclature with a view to secure a strict application of the law of priority in entomological work; compiled by Lord Walsingham and John Hartley Durrant (Merton rules). Longmans, Green & Co., London., New York, and Bombay; 2nd Nov., 1896; 18 pages. Price sixpence.

The rules are for the most part a good statement of current practice, with the suggestion of a considerable number of signs to facilitate brevity of reference without loss of accuracy. These may advantageously be adopted.

Rules 7, 20, 21, 24, 25, 29 and 30 imply a much more rigidly classical attitude in regard to names than is prevalent in America. The authors would have all names according to the rules of Latin orthography, and would change those that are not, even so radically as *gypsodactylus* for *cretidactylus*. Names with similar sound are rejected; e. g., *Ucetia* invalidates *Euseisia*, also those which involve a false proposition, or are offensive politically, morally, or by irreverence.

Rule 12 defines publication as including the possibility of purchase. If the rule be not extended, it would invalidate all species published in Government or private papers which are distributed without charge.

The definition of a genus by designation of type without description is not referred to, and apparently is condemned by implication.

The case of restriction of a heterotypical genus to one type by the successive removal of species to other genera by subsequent authors is not explicitly stated, and might well be added to rule 42.

A few rules about the formation of family names might have been added, for example:

1. Family names shall be formed by adding —idæ to the stem of some genus included in the family.
2. The generic name so used must be a valid one.
3. The first generic name used in a plural form shall be the one so used for the family type unless it be invalid, in which case the next generic name included in the family, which has been used in a plural sense, shall be substituted according to the rule of priority.

HARRISON G. DYAR,

MONOGRAPH OF THE BOMBYCINE MOTHS *I. Notodontidae*, by Alpheus S. Packard, M. D., National Academy of Sciences, Vol. VII.

This magnificent work is, without doubt, an immense credit to the author, and will take a permanent place among the triumphs of American Lepidopterology. It is not my intention to discuss matters of general classification or nomenclature here. My reasons for differing on certain points as to the latter have all been given elsewhere, and the merits of the Comstock-Dyar classification have been insisted upon by Dr. Dyar. Dr. Packard's work, as a whole, with its superb technical execution, has a value which could have been only enhanced by his attention to points of nomenclature, which I believe cannot be properly contradicted, and by his adhesion to a scheme of general classification, which I believe cannot be adequately gainsaid. I can here, out of my present limited knowledge, merely mention a few points, which may be of general or only of particular interest. There are a few errors in authorities. I do not know why my *Notodonta stragula* and *Schizura leptinoides* and *S. eximia* are given to Grote and Robinson (plates). Nor do I know why my name is placed in brackets after *Heterocampa Belfragei*. I described the latter as a *Heterocampa*, and have no responsibility for its having been placed under *Litodonta*, a reference which never occurred to me. I differ from Dr. Packard as to the validity of *Litodonta*. The costa is straighter, the primary fuller outwardly over internal angle, apex sharper, while the antennal structure is decisive, as compared with *Heterocampa subrotata*; the orange spots are peculiar. *H. subrotata* is a miniature *obliqua*, and is placed next in my list. *H. celtiphaga* is founded on obscurely marked and small specimens, probably not different specifically. *Litodonta* may be a more specialized form, from the character of the female antennæ; the discovery of the larva will be attended with interest. The unhappy influence which Mr. Walker has exercised is very apparent, and the synonymy of *Schizura ipomeæ* exhibits this at its worst. I do not insist upon the validity of *S. telifer* as a species; the black streaks are very distinct in both sexes and our nomenclature was invented to designate such forms, if not as species then as varieties. With regard to *Hyarpax*, and in connection with Dr. Packard's remarks upon *H. perophoroides*, I again draw attention to my previous statements as to Abbot and Smith's plate, that the figure of the female *aurora* at least approaches that form. The late Mr. Hy. Edwards sent me at one time a damaged specimen (I think without head or feet) of a well-sized pink

and yellow moth from Colorado, resembling this genus or *Anisota rubicunda* in colours. I would not describe it, but returned it as a probably new Noctuid. The figure of *Euhyparpax* distantly recalls the specimen, which must be in coll. Central Park Museum. The figure (Plate VI., 14) certainly does not look like a Ptilodont, rather like an Agrotid, but, especially an uncoloured figure, may be deceptive.

A short classification of the *Melalophide* may be found in 'Entomologist's Record,' VIII., 107, but I find since that *Phalera*, Hubn. Verz., 147, 1816, is preoccupied by *Phaleria*, Latreille, 1804. Another name must be used for the genus of *bucephala* and the subfamily of which I made it the type. As to *Datana*, I rather missed an allusion to the fact that Grote and Robinson first drew attention that there were many closely allied species, and to the characters of the uneven margin, differences in the lines and general tinting which serve to distinguish the moths. One paper in Vol. VI. of the Proceedings Ent. Soc., Phil., was an answer to the criticism passed by the late Mr. Walsh upon our previously described *Datana perspicua*. There is still a memorandum in my note-book of a reference in this genus which I do not seem to have published and which I do not find in either Packard or Dyar.

A. RADCLIFFE GROTE, A. M.

PRELIMINARY NOTES ON THE ORTHOPTERA OF NOVA SCOTIA; by Harry Piers. Transactions of the N. S. Institute of Science, Vol. IX, 1896.

So little attention is paid to Entomology in the Maritime Provinces that we gladly welcome this contribution to the subject and are much pleased that Mr. Piers intends to devote some years to the study of the order Orthoptera. The paper before us gives some very interesting notes on the habits and range of fourteen common species of cockroaches, crickets, and locusts, and describes more at length the ravages committed by *Melanoplus atlanis* on Sable Island, a hundred miles off the coast of Nova Scotia in the Atlantic Ocean.

C. J. S. B.



REV THOMAS W. FYLES, F. L. S.

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No. 2.

THE REV. THOMAS W. FYLES, F. L. S.

We have much pleasure in presenting to our readers the excellent portrait of our colleague, the Rev. Thomas W. Fyles, who has been for many years an active member of the Entomological Society of Ontario. Though living at South Quebec, he has regularly attended the annual meetings at London, travelling many hundreds of miles in order to do so, and has invariably delighted those present with his excellent papers. He was a member of the Council from 1882 to 1888, when the change in the Act of Incorporation required the directors to be resident within certain districts of the Province of Ontario. Three times he has represented the Society as their delegate to the Royal Society of Canada at Ottawa, and he has been a member of the editing committee of the CANADIAN ENTOMOLOGIST since 1889. While filling the arduous position of chaplain to the immigrants landing in Canada, under the auspices of the Society for Promoting Christian Knowledge, he devotes any spare moments that he can get to the study of entomology. He has succeeded, with an energy and enthusiasm worthy of admiration, in forming an extensive collection of insects, and acquiring a knowledge of the science beyond what is ordinarily met with. That he may long continue to carry on his excellent work, both in his official position and in his scientific pursuits, is the hearty wish of all his friends.

A PARASITE OF HEMIPTEROUS EGGS.

BY T. D. A. COCKERELL, MESILLA, N. M.

The following description is offered of an insect to which I shall have occasion to allude in a forthcoming Bulletin, wherem such descriptive matter would be inappropriate.

Hadronotus mesille, n. sp.—♂. Length slightly over 1 mm; black; coxæ black, legs otherwise rufous. Antennæ dark rufous, arising just above mouth, delicately pubescent; pedicel oval, shining, punctured, conspicuously shorter than the long first flagellar joint, second flagellar joint shorter than the first, but fully twice as long as broad; third to fifth joints oval, shorter than the second, the third slightly longer than the

following, all longer than broad. Head short, broadly transverse, slightly broader than thorax; lateral ocelli separated from the eyes by a space about equal to their own diameter; a depression in front of middle ocellus. Frons and face minutely reticulated by grooves, reminding one of crocodile hide. Thorax subglobular, somewhat broader than long, with very sparse short pubescence; anterior part of mesothorax very indistinctly subreticulately sculptured, its anterior margin with a distinct row of pits. Hind portion distinctly but very delicately and minutely reticulated with raised lines. Scutellum smooth, with a few hairs; hind margins of scutellum and postscutellum with a row of pits. Abdomen short and broad, carinated at sides, smooth, rather shiny. Wings hyaline, quite hairy, fringe short, nervures rufescent; marginal vein short, not half length of stigmal.

Habitat.—Las Cruces, New Mexico; bred from eggs of some Hemipteron, apparently Pentatomid. The eggs are barrel-shaped, pale gray with a white base and a white ring at top, the lid with a white central ringlet, and its suture white. Only one specimen was bred, and the tips of its antennæ are broken off, but the species differs at once, by its reticulate sculpture and other characters, from all those described by Mr. Ashmead in his Monog. Proctotrypidæ or in his work on the Hymenoptera of St. Vincent. Another parasite of Pentatomid eggs occurs in the Mesilla Valley, namely, *Trissolcus euschisti*, Ashm. (a Mesilla example det. Ashm.). With us, I believe it is a parasite on the eggs of *Brochymena obscura*, H. S., which abounds in orchards.

NOTES ON VANESSA INTERROGATIONIS.

BY W. F. FISKE, MAST YARD, N. H.

I remember about ten years ago to have taken several large specimens of a *Grapta*, probably *G. interrogationis*, but they were lost without being identified. I saw no more of the species until August, 1895, when I took a fine example of the form *Fabricii*. It proved to be the forerunner of a "wave" of the species, and from that date until frost a number were seen, perhaps in all twenty or more, but all but two of them were of the form *Fabricii*. This spring I watched the hibernating butterflies closely, hoping to obtain a fertile female and rear a brood of larvæ, but although there were many *G. comma* and *j-album*, and a few *progæ* and *faunus*, on the wing throughout April, I did not observe one *interrogationis* amongst them. By the middle of May the other species of *Grapta* had

disappeared, or were represented by a few specimens worn almost beyond recognition. I had about given up meeting with *interrogationis* that spring, when on the 16th of May I captured a large but badly worn *umbrosa* fluttering over lilac blossoms. I was surprised that it should be of this form instead of the more common *Fabricii*, but what was my astonishment to see four or five more of the same form the same day. During the rest of May and first part of June the species was common, but not one *Fabricii* was seen. A large female was captured while ovipositing on elm, and netted over a branch of that tree. She deposited a large number of eggs indiscriminately on leaves, branch, and net, in most cases singly, but in a few instances in "chains" of three or four. In order not to disturb the eggs, I let the net remain as it was until the larvæ should hatch, and then, thinking that the larvæ would do better in the open air, left it until they had passed the second moult, when on removing it I found only eight remaining. These pupated without further accident, and on the 13th of July and the few days following five imagoes emerged—three *Fabricii* and two *umbrosa*. This was after the larger part of the brood of *j-album* had emerged and several weeks after the first brood of *comma*, and as the former species is probably but single brooded here, I was not expecting a second brood of *interrogationis*. It was with some surprise, therefore, that a large colony of young larvæ were discovered in the latter part of August feeding on the heads of hops. Later several other colonies were found on hop and elm, and a number of larvæ were transferred to my breeding-boxes and carried successfully to pupation, but as many of the pupæ rotted, only about thirty imagoes, all *Fabricii*, were obtained. The last specimen, delayed by a long continued "spell" of severe weather, did not emerge until November 6th, after being in the pupa state nearly six weeks and freezing at least once. It was smaller and darker than the average, but not otherwise remarkable.

Now, the question which I wish answered is, Where did the large number of *umbrosa* come from that appeared here so suddenly in May? They certainly did not breed here, because every specimen seen was badly worn, and they could not have flown in any such numbers either the same spring or the fall before, and besides, the fall before it was *Fabricii* that was in the majority. The only explanation which I can offer is that they migrated thither from some other locality, probably in the South. *Pyrameis atalanta* appeared about the same time in very large numbers, but as the species has always been more or less common,

I did not think it so remarkable. The first brood of larvæ of this species are usually so scattering that it is difficult to find them. This summer they were so numerous as to completely strip large clumps of nettle, so that numbers of larvæ must have perished for want of food. Some large and healthy bunches of nettle were so weakened by the larvæ of this species and of *Vanessa Milberti* repeatedly stripping them of every green leaf that they have probably died.

LARVAL STAGES OF AMPHION NESSUS (Cr.)

BY WILLIAM BEUTENMULLER, NEW YORK.

Egg.—Pale green, almost globular; very similar to that of *Everys myron*, but smaller. Young larvæ collected at Greenwood Lake, New Jersey, June 25th. Length, 1 mm.

Stage I.—Pale apple-green, with numerous minute white dots and a narrow white subdorsal stripe along each side, beginning at the anterior part of the first segment and running to the base of the caudal horn, which is black, and brown at the base. Length, 9 mm. Moulded June 28th.

Stage II.—Very much like the preceding stage, but the white dots and the subdorsal stripe are much heavier and more distinct. Caudal horn jet black, reddish-brown basally. Head with a narrow white stripe on each side. Length, 13 mm. Moulded July 1st.

Stage III.—Much like the last stage, but the stripes on the head are continuous with the ones on the subdorsum; the third and fourth segments are now considerably swollen and thicker than the remaining segments. Caudal horn black, reddish-brown at the base. Spiracles black. Length, 17 mm. Moulded July 4th.

Stage IV.—Same as the last stage. Length, 22 mm. Moulded July 7th.

Stage V.—The general colour is now dirty orange-brown, speckled with small smoky-black dots. On the junction of the segment along the dorsum is a smoky-black spot, and along the sides is a series of oblique smoky-black bands, the last one running to the base of the caudal horn, which is black. From the head to the end of the third segment are three black stripes, one on the dorsum and one on each side on the subdorsum. Head dirty purplish-brown, with a whitish stripe on each side. Under side darker than above. Length, 45 mm. Full-grown July 18. When fully fed the larva spins a rude cocoon between a few leaves on the ground.

Food-plants: Grape and Virginia creeper.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XX. THE CHRYSOMELIDE OF ONTARIO AND QUEBEC — (*Continued*).

TRIBE IX.—GALERUCINI (Sub-tribe II.—HALTICINI).

The "jumping beetles," or "flea beetles," constitute the above sub-tribe, and are separated from the genuine Galerucini by the fact that the hind thighs are greatly enlarged and thickened for leaping. Most of the species are quite small, though a few are of moderate size for this family, and a considerable number of them are prettily coloured. They are of great importance from an economic standpoint, a number of them being quite injurious. The identification of some of the members of this group is attended with considerable difficulty, yet most of the genera have a peculiar facies, which, once grasped, renders the proper location of additional specimens tolerably certain.

The sub-tribe has recently been worked up in detail, as far as the North American species are concerned, by Dr. Horn, from whose paper on the "Halticini of Boreal America" most of the tables and specific diagnoses have been condensed. His paper has rendered possible an intelligent survey of the group — something heretofore lacking in the American literature on the subject. The diagrams representing elytral markings are reproduced from the figures given in his article.

- A. Last joint of hind tarsi globosely inflated; elytra with confused punctuation, surface glabrous. Size, large or moderate. *Ædionychis*.
 AA. Last joint of hind tarsi not globose, usually slender, sometimes thickened when viewed laterally.

b. Anterior coxal cavities open behind. Mesosternum visible.

c. Prothorax without antebasal transverse impression, hind tibiæ faintly or not grooved.

d. Moderate or large sized species, first joint of hind tarsi short, as compared with tibiæ, and rather broad. *Disonycha*.

dd. Small species, first joint of hind tarsi long and slender.

Hind tibiæ grooved on outer edge, first joint of hind tarsi as long as one-half the tibia *Longitarsus*.

Hind tibiæ not grooved, slightly excavated near tip; first joint of hind tarsi about one-third as long as tibia *Phyllotreta*.

- cc. Prothorax with antebasal impression, which is transverse, usually feeble and not distinctly limited at each extremity *Haltica*.
- bb. Anterior coxal cavities closed behind.
- c. Antennæ 11-jointed, approximate at base.
- f. Posterior tibiæ sinuate near the apex, the sinuation limited above by a distinct tooth; first two ventral segments connate, but with distinct suture; thorax without antebasal impression *Chaetocnema*.
- ff. Posterior tibiæ without either sinuation or tooth.
- g. Thorax with distinct antebasal transverse impression, usually well limited at its ends. Elytra punctato-striate.
- h. Elytra glabrous.
- Form more or less ovate; antennæ moderate *Crepidodera*.
- Form elongate, parallel; antennæ as long or longer than body *Orthaltica*.
- hh. Elytra with rows of setæ on interstices, giving a pubescent appearance. Form short, ovate; antennæ not elongate *Epitrix*.
- gg. Thorax without *transverse* antebasal impression.
- i. Spur of hind tibia small and slender.
- Thorax with short, deep *longitudinally* impressed line each side; elytra punctato-striate, paler at tip *Mantura*.
- Thorax without impression, elytral punctuation confused *Systema*.
- ii. Spur of hind tibiæ broad, emarginate at tip *Dibolia*.
- ee. Antennæ 10-jointed, hind tibiæ prolonged beyond the insertion of the tarsus, which is placed rather on the outer side, above the apex *Psylliodes*.

(EDIONYCHIS, Latr.

The species of this genus are of large or moderate size (for Halticini) and are readily recognizable on account of the inflated or globose claw-joint of the hind tarsi. Some of them are of bright colours and handsomely marked. The Canadian forms are thus separated by Dr. Horn:

- A. Antennæ stouter, scarcely one-half the length of the body; species larger and more convex, front of head oblique, elytra never explanate at sides.

b. Elytra entirely blue, green, violaceous, blackish or testaceous.

c. Body never entirely black beneath.

Elytra bright blue or green, thorax smooth; body beneath entirely pale. .18-.28 in. *gibbitarsa*, Say.

Elytra violaceous or greenish-black, thorax more or less distinctly punctate, body beneath in great part dark, thorax yellowish with a large piceous space or M like mark blackish. .16-.28 in. *vians*, Ill

cc. Body entirely black beneath, upper surface dull black, impunctate. .18-.22 in. *lugens*, Lec.

bb. Elytra with pale margin, disk violaceous or bluish.

Thorax and elytra coarsely and closely punctate.

.20-.26 in. *thoracica*, Fabr.

Thorax and elytra indistinctly punctured, elytra brilliant violaceous. .20-.24 in. *flavocyanea*, Cr.

AA. Antennae slender, equal to or greater than one-half the length of the body; front of head vertical, elytra with explanate margin.

d. Elytra broadly oval, sides much arcuate, coarsely punctate; may be yellowish with indistinct vittae, or black with only the margin pale. .14-.20 in. *limbalis*, Mels.

dd. Elytra with sides feebly arcuate or nearly parallel, yellowish, with indistinct brown spots and bands or with the disk entirely piceous.

e. Thorax very coarsely punctured, elytra with a more or less evident costa extending from humeri to apex, yellowish with blackish spots which sometimes coalesce to form an X, behind which is an irregular transverse band. .14-.16 in. (fig. 5)... *sexmaculata*, Ill

ee. Thorax finely punctured or smooth.

Head coarsely punctate, punctures closely placed; yellowish; elytra with base, suture, and often two spots on each, brown. .14-.16 in. *suturalis*, Fabr.

Head sparsely punctate or nearly smooth; thorax often entirely yellow, or may be piceous with the margin pale; elytra piceous with yellow margin,



FIG. 5.

rarely with two large yellowish spots on each.

.14-.15 in. *guercata*, Fabr.

While *flavocyanea* is included in the above table, on account of its being recorded in the Society's list, it has probably been identified in error, since it is a Southern species.

DISONYCHA, Chevr.

Also contains large or moderate sized species, some of them even exceeding (*Edionychis*, which they often resemble in markings, but they may easily be separated therefrom by the claw-joint of the hind tarsi not being swollen. They separate thus :

A. Elytra not striped.

Thorax yellow with three black spots arranged in the form of a triangle ; under surface of body and the legs black .20-.25 in. *triangularis*, Say.

Thorax yellow, not spotted; abdomen yellow, femora usually yellow at basal half. .21-.23 in. *xanthomelæna*, Dalm.

AA. Elytra striped.

b. Form very elongate; elytra vaguely grooved; thorax somewhat uneven.

Body beneath black, except sides of thorax, which are margined with yellow. Black spot on disk of thorax very large. var. *limbicollis*, Lec.

Body beneath partly black, abdomen paler at sides and apex, thorax with under surface entirely yellow, discal spot on upper surface smaller. .26-.30 in. *pennsylvanica*, Ill.

bb. Form not very elongate; elytra and thorax even, the former with discal and submarginal vittæ.

c. Abdomen densely punctured, conspicuously pubescent.

d. Head coarsely punctured from side to side. .22-.36 in. *quinquevittata*, Say.

dd. Head smooth at middle.

Elytral vittæ rather broad, head and body beneath more or less clouded with darker, labrum piceous. .22-.26 in. *crenicollis*, Say.

Elytral vittæ narrow, head and body beneath always pale yellow, labrum pale. .20-.26 in. *caroliniana*, Fabr.

cc. Abdomen very sparsely punctured, pubescence scarcely visible.

Thorax smooth, head rough, epipleura black. .20-.22
in. *glabrata*, Fabr.

It is quite likely that *glabrata* may have been recorded in error; the species called *5-ruttata* is the one everywhere identified as *alternata*, and so recorded in the Canadian lists; while *crenucollis* and *caroliniana* are inserted in the table, with the characters assigned them by Dr. Horn, since it is, to my mind, likely that one of these is the species which was mistaken for *glabrata* by the Canadian recorder.

HALTICA, Geoffr.

The species belonging here are of moderate size, none of them with markings of any sort on the upper surface of the body, which is blue, green or bronzed, and usually shining. The thorax is marked near the base with a transverse more or less distinctly impressed line, which has been used as a means of differentiating species. The following table is a tolerably close copy of that of Dr. Horn, and will serve to distinguish the recorded Canadian forms with some degree of accuracy.

A. Elytra with a prominent lateral plica along the lateral submargin, giving the appearance of a double margin. .20-.24
in. *bimarginata*, Say.

AA. Elytra not plicate.

Thorax with deep antebasal groove extending *completely* across.

Larger (.16-.20 in.) usually blue, form robust, thorax distinctly wide at base. *chalybea*, Ill.

Smaller (.12-.16 in.) metallic, brassy, blue, green or bronze.

Elytra distinctly sparsely punctate at base, more faintly toward apex. *ignita*, Ill.

Thorax with transverse antebasal groove, which is not entire.

Transverse impression, ending in a fovea on each side. .18
in. *evicta*, Lec.

Transverse impression gradually evanescent at either end.

Impression deep, humeri of elytra well marked, thorax relatively coarsely punctate. Elytral punctuation coarser than usual. Colour more or less coppery, sometimes nearly blue. .14-.18 in. *carinata*, Germ.

Impression feeble, almost obliterated, humeri rounded, thorax sparsely punctulate, elytra scarcely visibly punctate, colour bright green to dark blue. .14-.18 in. *foliacea*, Lec.

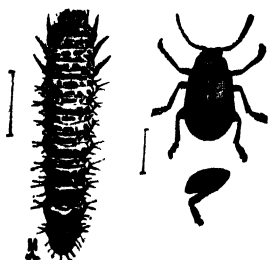


FIG. 6.

It should be remarked that *crista* is a Pacific Coast species (found in Oregon), of which I have seen no Canadian examples; while *foliacea* is Southern, occurring in Texas, Colorado, New Mexico, and Arizona. *H. inarata*, Lec., is synonymous with *ignita*.

(Fig. 6 represents the larva and beetle of *H. chalybea*, and a leg of the latter, showing the greatly thickened thigh.)

CREPIDODERA, Chev.

The best known species of this genus is *Crepidodera helxines*, a bright metallic blue or green flea beetle, very commonly found on willows. All of the members belonging here are quite small, and do not resemble each other at all closely, so that reference should be had to the generic characters (as laid down in the table of genera) before trying to place any presumed *Crepidodera*s by the following specific analysis, which is that of Dr. Horn:

Form oblong oval; elytra uniform in colour with the head and thorax, surface metallic, blue or green; thoracic punctuation abundant, intermixed. .09-.13 in. *helxines*, Linn.

Form oval, narrowed in front; colour piceous, with slight aeneous lustre, apical third of elytra indeterminately testaceous. .08-.10 in. *modeeri*, Linn.

Form broadly oval and convex; colour rufotestaceous, without metallic lustre; abdomen piceous, prothorax not distinctly punctured. .06-.07 in. *atriventris*, Mels.

EPITRIX, Foudras.

Contains one Canadian species, *E. cucumeris*, Harr., the "cucumber flea beetle" (fig. 7), which is often found very abundant on potato vines. It is a small (.06 to .08 in.), ovate, slightly oblong beetle, nearly black in colour, the legs reddish or brownish, femora often darker. It may easily be told from any of the *Crepidodera*s or other genera which might otherwise resemble it, in our fauna, by the fact that the upper surface is pubescent. The thoracic punctures are well separated from each other; the elytral striæ, especially near the suture, very feeble.



FIG. 7.

ORTHALTICA, Crotch.

O. copalina, Fabr., is an elongate-parallel insect, of shining surface, brownish or blackish in colour. .08-.10 in. long. The antennæ are more elongate than usual in the Halticini, equaling about two-thirds of the length of the body in the male, somewhat shorter in the female. The antennæ and legs are rufotestaceous, the thorax is broader than long, sides arcuate, margin finely serrate, punctures coarse and deep, but not densely placed. Elytra with nine striæ of closely-placed coarse punctures, intervals narrower than the striæ. I have found this species in abundance on the flowers of sumach.

SYSTEMA, Clark.

The species of this genus are rather elongate, somewhat depressed or only moderately convex in form. The antennæ are about one half the length of the body. Some of them are injurious to cruciferous plants. Two of the Canadian species are dark, the other two pale or vittate. They may be separated thus :

Black, head reddish. .14-.20 in. *frontalis*, Fabr.

Black, head not red ; joints 3, 4, 5 of antennæ testaceous. .18 in. *hudsonias*, Forst.

Elytra pale or striped.

Surface shining, punctuation fine ; may be entirely pale, or the elytra may be vittate. Under side of body and sides of thorax often piceous. .12-.18 in. *teniata*, var. *blanda*, Mels.

Surface subopaque, punctuation coarse, clove and deep. .14-.16 in. *marginalis*, Ill.

LONGITARSUS, Latr.

Three species have been reported from the region under discussion. They all belong to the division of the genus in which the fourth antennal joint is not longer than the second, and are distinguished by the use of the following characters in the table of Dr. Horn :

Surface entirely shining, form robust, elytral humeri well marked, punctuation rather coarse. Colour blackish. .07 in. *erro*, Horn.

Surface more or less alutaceous, thorax always so, form more elongate, humeri not prominent.

Elytra not shining, punctuation very indistinct ; colour yellowish-testaceous. .07-.08 in. *testaceus*, Mels.

Elytra shining, punctuation coarse ; colour dark rufotestaceous to nearly piceous. .08 in. *melanurus*, Mels.

GLYPHINA, Lec.

Species of this genus will almost certainly be found in Canada. They have the elytral punctuation disposed in rather regular striae, while in *Longitarsus* the punctures are confused. Otherwise there is considerable similarity between the two genera, as far as aspect is concerned.

PHYLLOTRETA, Foudras.

Contains a few species only, the Canadian ones all being of a piceous colour, more or less aeneous or greenish, shining, the elytra marked with yellow stripes or spots. (*P. vittata*, fig. 8.) Often injurious by their great abundance; they are to be seen on the leaves of horse-radish, wild mustard, and various allied plants, wild or cultivated. It should be noted that the record for *lepidula* ought to be carefully verified, since the species is Californian. *P. sinuata* has been included in the table, though not actually known to occur in Canada.

A. Fifth joint of antennae much enlarged (♂) or longer than the sixth (♀). Elytra usually vittate, rarely spotted.



FIG. 8

b. Elytral vitta simple, narrow, nearly straight, but incurved at the apex. .08-.10 in. *lepidula*, Lec.

bb. Elytral vitta sinuous, more or less dilated or appendiculate at ends.

Vitta incurved at base, approaching the scutellum; intermediate portion sometimes wanting, leaving the apical parts in the form of spots (fig. 9a.). .08 in. *vittata*, Fabr.

Vitta parallel with suture at its basal half. .10 in. (fig. 9b). *sinuata*, Steph.

AA. Fifth joint of antennae not modified; fifth joint not longer than sixth in either sex. Piceous, not metallic. Each elytron with two oval yellow spots, one humeral, the other near the apex. .08-.10 in. *bipustulata*, Fabr.



FIG. 9.

MANTURA, Steph.

Represented by *M. floridana*, Cr., an oval, somewhat elongate, moderately convex beetle, of a brownish colour, faintly bronzed above; thorax without transverse antebasal impression, longitudinal basal impressions deep and triangular. Elytra indefinitely paler at apical third. Legs reddish, hind femora darker, each of the tibiae with a terminal spur. In colour this species somewhat resembles *Crepidodera modeeri*, Linn.,

but that insect has a moderate transverse antebasal impression on the prothorax. Length, .08 in.

CHETOCNEMA, Steph.

This is a large genus, well represented in the United States. The Canadian list contains only three species, one of which (*alutacea*, Cr., known from Georgia and Florida) may be erroneously cited, leaving only *denticulata* and *parcepunctata* as undoubted natives. Several are known from the Lake Superior region, and some of them must undoubtedly occur in Ontario. Following Dr. Horn's arrangement, these recorded forms may thus be known, all of them belonging to the group in which the sides of the thorax are not obliquely truncate at the front angles.

Head distinctly punctate; upper surface of body bright bronze or brassy; elytral striae of coarse deep punctures, the scutellar series usually irregular, the remainder not confused. Form oval, not elongate, clypeo-frontal region subopaque. .08-10 in. *denticulata*, Ill
Head impunctate.

Thorax with entire basal marginal line, which is not defined by punctures; legs entirely piceous, surface subopaque. .06-.08 in. *alutacea*, Cr.

Thorax finely and sparsely punctate, with basal marginal row of distinct punctures, surface shining. Femora piceous, tibiae and tarsi brownish or rufotestaceous. .06 in. . . *parcepunctata*, Cr.

DIBOLIA, Latr.

The form of the spur of the hind tibiae (broad with a distinct emargination at tip) will in itself define the genus. *D. borealis*, Chev. (= *area*, Melsh.), is recorded from Canada and is about .12 in. long, oval, convex, robust, the surface bronzed, elytral striae of coarse punctures, anterior and middle legs and hind tibiae reddish.

PSYLLIODES, Latr.

Antennae ten-jointed, inserted against the inner border of the eye, hind tarsi inserted before the end of the tibiae and slightly to the outer side, first joint more than half the length of the tibia. The Canadian species is *P. punctulata*, Mels., a bronzed beetle .08-.10 in. long, of elongate-oval, rather convex form, thorax at base not narrower than the elytra, which are punctato-striate, the punctures coarse and deep, closely placed. The male has the last ventral distinctly impressed.

ON LEDRA PERDITA, A. & S.

BY CARL F. BAKER, AUBURN, ALABAMA.

On page 577 of their great work on the Hemiptera, Amyot and Serville describe two species of *Ledra*. One, *L. aurita*, the well-known species of Europe, was characterized from specimens collected near Paris. I have specimens of it now before me. Its size, the broad membranous prolongation of the head, the ear-shaped horns on the thorax, together with other details of structure, separate it widely from any other homopterous insect. The other species described, *L. perdita*, though equally unique in form, was characterized under circumstances which, for such eminent scientists as Amyot and Serville, seem extraordinary. After a three-line description, they remark: "L'exemplaire unique d'après lequel cette espèce a été figurée, ayant été détruit, nous la décrivons d'après la figure." Unfortunately, the figure, number five on plate II., is very poor. The species is credited to "Amérique septentrionale."

Since that time the species has never again been recognized, although often noticed in hemipterological literature. Mr. Van Duzee, in his "Catalogue of the Jassoidea," lists it as an unquestionable *Ledra*, and gives its habitat as Pennsylvania, on the authority of Amyot and Serville.

It is perfectly evident from the figure that the species is not a *Ledra*. It lacks utterly the characteristic head structure of *Ledra aurita*. It is equally evident that the figure is that of a Membracid belonging in the Centrolinae, near *Microcentrus caryæ*, Fh. Indeed, Dr. Goding tells me Fitch himself noticed this resemblance.

During several years past I have been receiving quantities of material in Homoptera from many localities in Pennsylvania and throughout the East. This material is the result of careful work by good collectors, and contains immense series of the native Membracids and Jassids. In the examination of this material I have been constantly on the watch for *Ledra perdita*. Lately it has occurred to me in several specimens from Pennsylvania, New Jersey, and Indiana, collected by Messrs. Dietz, Liebeck, and Weith. There is nothing else among all the American material I have examined that is at all like this species, with the single exception of *Microcentrus caryæ*, and that lacks the long ear-shaped horns on the thorax. So peculiar in form is it that there is not a possibility of confusing it with anything else in our fauna.

And not until another species from the same region shall have been discovered, having closer affinities with it than has *Microcentrus caryæ*, will there be any reasonable grounds for doubting that this, which I so refer, was the form which Messrs. Amyot and Seville described under the name *perdita*.

I forwarded specimens of the species to Dr. Goding, and was much surprised to learn that it was identical with his *Centruchus Liebeckii*, also from Pennsylvania, described on page 471 of the List of N. A. Membracidae. In a letter he cites the genus as "*Centruchoides*," which I suppose to be a manuscript name founded on this species. I, however, believe this species (which in future must be known as *perdita*, A. & S.) to be congeneric with the *caryæ* of Fitch. I have specimens of *caryæ* with rudiments of thoracic horns. Outside of this character the species are very closely related.

I have yet to see a true *Ledra* from either North or South America.

SOME NEW SPECIES AND VARIETIES OF LEPIDOPTERA FROM THE WESTERN U. S.

BY WM. BARNES, M. D., DECATUR, ILL.

Argynnis Charlottii, n. sp.

♂.—Upper surface very much like *Cybele*; differs from *Leto* in the lighter shade of the ground colour and the much darker and more extensive basal area. This area is sharply limited at the outer edge and extends to the median row of markings, which on the hind wings are quite obscured by it. The apical region is not so clear as in *Leto*, the row of round spots in the outer belt continuing of large size up to the costa, and the dark blotch lying just within the upper three spots is very prominent, as in *Cybele*.

Under surface clearer, brighter, and markings less heavy than in *Leto*. The marginal brown shading very faint, and the submarginal row of crescents, which on the secondaries are very narrow but well silvered, have but a very fine edging of the same shade. The dark basal area stops sharply at the median row of silvered spots, as in *Cybele*, and is not present on their outer side, as in *Leto*.

♀.—Upper surface closely resembles *Leto*, the ground colour and basal area being the same. The markings are, however, not so heavy and the submarginal row of lunules do not so completely enclose the row of spots of the ground colour. On the under surface the markings

are not so heavy as in *Leto*; the apical region is clearer, the three or four brown spots so conspicuous in *Leto* being here wanting or but faintly indicated. The outer belt on the secondaries presents the same clean-cut character as in the male, owing to the absence of the brown shadings to its inner and outer sides.

Types.—1 ♂ and 2 ♀s in my collection, from Glenwood Springs, Colo.

This species stands intermediate between *Leto* and *Cybele*. The locality has been thoroughly worked for several years and no typical *Leto* taken there. I have *Leto* from Utah, California, Nevada, Oregon, Idaho, Montana, and British Columbia, and they are uniform in their points of difference from the form here described.

Melitæa Gillettii, n. sp.

♂ expands $1\frac{1}{2}$ inches; head and thorax black; abdomen black above, beneath yellowish-white; palpi and legs dark red; antennæ fuscous, club yellow; wings, ground colour black, markings dull red and white, veins black. Primaries above show a wide margin of the ground colour, in which are two rows of spots; the margin red, very faint, scarcely discernible except towards apex; the second row is white, small and not very prominent; the third row is red, the spots are large, quadrate and completely fill the intercellular spaces, thus giving the appearance of a broad red band cut by the black veins; the fourth row is rather irregular, white and joined opposite the cell by a demi-row from costa; two red and two white spots in cell; two white spots and one red in subcellular space; basal area rather obscured with black.

Secondaries above have the four outer rows as on primaries, the marginal red row even fainter, two red and one white spot in cell and a white subcellular spot. The under surface shows but little of the black ground colour, it being reduced to the veins and lines between the rows of spots, which are all rather quadrate in shape, filling the intercellular spaces, thus giving a well-marked, banded appearance. The marginal band is red and is followed by the white, red, and white bands as on upper surface. The cellular and subcellular spots on primaries same as above, only larger and more distinct. On basal area of secondaries there are four white spots, separated by an irregular shaped red area, the result of a fusion of the red spots.

Described from seven ♂s taken in Yellowstone Park, Wyoming, July 18.

This species is very closely allied to *M. Iduna*, Dalm., of Lapland, but in that species the antennæ are black and the red band not half so wide. That a species so distinct from any other thus far described from N. A. should be turned up at this late day is remarkable, and shows the possibilities of many other interesting discoveries when the Park region is thoroughly explored.

Melitea nubigena, var. *capella*.

In the Henry Edwards collection are specimens of a *Melitea* separated under the above name; but in so far as I know, no description was ever published. The variations of *nubigena* are without number, yet they all come into one of three general classes. In Western Colorado and Utah the tendency is towards a gradual increase of the white at the expense of the red and black, producing forms allied to *Wheeleri*, Hy. Edw. Farther north in the Yellowstone region the tendency is to darker forms, the black replacing the red to such an extent that the spots are small and round, set in a black ground. Around Manitou and Denver forms occur which are of a solid brick red, the white being entirely gone and the black reduced to the veins and fine cross lines, the latter even being wanting in portions of the wings. On the primaries the spots at the costal end of the third row are the last to lose the white colour, and in most of the specimens there are traces of it remaining there. In some few males there is none whatever. The fourth row on the secondaries preserves the whitish colour the longest, but not so tenaciously as is the case on the primaries. In some specimens which have entirely lost the white, the black ground colour still remains well marked, while in others there is considerable fusion of the red spots, while considerable of the white is retained. It is to those dark red forms that Hy. Edwards applied the name *capella*, and I take pleasure in retaining the name proposed by him.

Described from eight pairs in my collection and others among my duplicates.

Colias pelidne, var. *Skinneri*.

Male, expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inches; upper surface of a greenish-yellow shade somewhat darker than *Scudderi*, lightly dusted with dark scales over costal two-thirds of primaries, marginal bands not so broad and cut less deeply by the yellow nervules than is the case in *Scudderi*. The inner margin of the border varies, being almost entire in some specimens,

dentate in others, and in a few erose. The discal spot on primaries black, much more distinct than in either *Scudderi* or *pelidne*. In some few specimens the spot is centered with a few yellowish scales, the spot on secondaries about the same as in *Scudderi*. Under side of primaries yellow, paler along the inner margin, thickly dusted with dark scales over costal two-thirds from base to just within the line where the inner margin of the black border of the upper surface shows through; discal mark faint—scarcely discernible in many specimens. Secondaries thickly dusted with dark scales over the basal three-quarters, discal spot prominent, dark brown ring, centre silvered or white, more or less covered with roseate scales; costa and fringes, except at inner angle of primaries, roseate. Antennæ roseate; club roseate below, brown above; collar, head, legs, and a spot at base of secondaries, roseate; palpi roseate above, yellow beneath; thorax and abdomen dark above, covered with yellow hairs, yellow beneath. •

Female, expanse $1\frac{5}{8}$ to $1\frac{7}{8}$ inches; greenish-yellow or white, about evenly divided. Border well marked, varying greatly in extent. In some specimens, on the primaries it is broad, and entirely encloses a row of spots of the ground colour; in others, while equally broad, it is uniformly dark; from these there are all gradations down to one in which the black is restricted to the apical region, and to pear-shaped spots at the ends of the veins. On the secondaries the border is usually well marked, and extends in some almost to anal angle; in some examples, however, it is confined to the outer angle, as three or four blotches. The upper surface is less dusted with dark scales than in the male, the under surface about the same, the discal spots, fringes and other characters as in the male.

Described from 15 males and 7 females — three of which are yellow, three white, and one intermediate — taken in Yellowstone National Park, and at Arangie, Idaho, in July.

Mr. Bean, in CANADIAN ENTOMOLOGIST, Vol. XXII., p. 127, mentions specimens of a *Colias* intermediate between *Scudderi* and *pelidne*, and it is probable that this is the same, but as I have none of his material, and he gives no description of it, I am not certain.

Thymelicus Edwardsii, n. sp.

Upper surface bright golden-yellow, fringe dark brown within, lighter outwardly. Beneath primaries yellowish, except inner margin, which is shaded with black; hind wings yellow over the anal margin for one-third the width of the wing, rest grayish-yellow.

Type. — One male, taken near Denver, Colorado.

CATALOGUE OF THE PHYTOPHAGOUS AND PARASITIC
HYMENOPTERA OF VANCOUVER ISLAND

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

(Continued from page 21.)

Amblyteles subrufus, Cress.—One ♀ labelled *Ich. sequax*, received by Mr. Fletcher, appears to belong to this species. It is certainly not *sequax*.

Amblyteles suturalis, Say.

Amblyteles superbus, Prov.—Thirteen ♀s, including Provancher's type, which Mr. Davis has found to equal *suturalis* (CAN. ENT., Vol. XXVII., p. 287). They are yellower than Ottawa specimens, with sutural bands of abdomen weaker and sometimes wanting.

Amblyteles subfuscus, Cress.—Two ♀s.

Trogus buccatus, Cress.—♀ described from V. I. coll., H. Edw.

Trogus Edwardsii, Cress.—♂ described from same coll.

Trogus Fletcheri, Hargtn.—Type ♀ in my coll.

Platylabus pacificus, Hargtn.—Type ♀ in my coll.

Hemichneumon vancouverensis, Hargtn.

Hypocryptus vancouverensis, Hargtn.—Type ♂ in my coll. Mr.

Davis informs me that this species belongs to *Hemichneumon*.

Phæogenes discus, Cress.—One ♀.

Phæogenes fungor, Nort.—Two ♀s.

Phæogenes sectus, Prov.—One ♂. The species was described from coll., Taylor.

Centeterus canadensis, Hargtn.—Three types ♀ in my coll.

? *Herpestomus attenuatus*, Prov.

Phygadeuon attenuatus, Prov.—Taylor, *loc. cit.* Not seen.

Herpestomus orbus, Prov.

Phæogenes orbus, Prov.—The ♀ of this species was described by Provancher from a specimen sent to him by Mr. Fletcher. Not seen.

Phygadeuon crassipes, Prov.—One ♀. Differs from description in colour of ovipositor.

? *Phygadeuon seminiger*, Hargtn.

Semiodes seminiger, Hargtn.—Type ♂ in my coll. Mr. Davis thinks this belongs to *Phygadeuonini*.

Phygadeuon nitidulus, Prov.—One ♀. The ♀ of this species was described from coll., Fletcher.

Phygadeuon subspinosus, *Prov.*—Taylor; *loc. cit.* Not seen.

Cryptus extrematis, *Cress.* Ten ♂s sent to Mr. Fletcher are labelled as bred from *Trichiosoma*.

Cryptus flavipes, *Hargtn.* Type ♀ in my coll.

Cryptus Fletcheri, *Prov.*—♀ described from coll., Taylor.

Cryptus pentagonalis, *Prov.*—One ♂.

Cryptus punicus, *Cress.*—*Proc. Acad. Nat. Sci., Phil.*, 1878, p. 364.

Cryptus persimilis, *Cress.*—One ♂.

Cryptus proximus, *Cress.*—Three ♀s.

Cryptus resolutus, *Cress.*—One ♂.

Cryptus robustus, *Cress.* Taylor (*loc. cit.*), "Not uncommon." Not seen, and probably *proximus*.

Cryptus rufoannulatus, *Prov.*—Taylor, *loc. cit.* One ♀ received by Mr. Fletcher.

Cryptus ultimus, *Cress.*—Two ♂s. Labelled as bred from *Trichiosoma* in April.

Cryptus, n. sp.?—One ♀ near *vancouverensis*.

Cryptus vancouverensis, *Hargtn.*—Three types ♀ in my coll.

Cryptus victoriaensis, *Hargtn.*—Two types ♀ in my coll. One ♀ also received by Mr. Fletcher.

Chæretymma Ashmeadii, *Hargtn.*—Type ♀ in my coll. One ♀ also received by Mr. Fletcher. This has annulate antennæ; the antennæ of type were missing.

Orthopelma occidentale, *Ashm.*—One ♀.

Hemiteles crassus, *Prov.*—Taylor, *loc. cit.* Not seen.

Hemiteles militææ, *Ashm.*—One ♀.

Hemiteles occidentalis, *Hargtn.*—Type ♀ in my coll.

Hemiteles piceiventris, *Hargtn.*—Type ♀ in my coll.

Hemiteles scolyti, *Ashm.*—One ♀.

Ophion bilineatum, *Say.*—Eighteen specimens. These vary in size and colour, but apparently all belong to one species.

Ophion nigrovarium, *Prov.* (?)—Taylor (*loc. cit.*) notes that the single insect so determined for him was destroyed.

Anomalon Edwardsii, *Cress.*—♀ described from V. I. coll., H. Edw.

Anomalon nigrum, *Prov.*—Taylor (*loc. cit.*): "Several bred from pupæ of *Noctuæ*." Not seen.

Campoplex laticinctus, *Cress.*—One ♀.

Campoplex major, *Cress.*—♀ described from V. I. coll., H. Edw.

Limneria argentifrons, *Cress.*?—One specimen, without abdomen, labelled *flaviricta*, but cannot be that species.

Limneria compacta, *Prov.*—♀ described from coll., Taylor.

Limneria dubitata, *Cress.*—One ♀.

Limneria fugitiva, *Say.*—One ♀.

Limneria major, *Cress.*—One ♀. This is labelled *L. genuina*, *Say*, but there does not seem to be any species described under that name, although Provancher also quotes it in his work.

Limneria valida, *Cress.*—One ♀.

Angitia americana, *Hargtn.*—Type ♀ in my coll.

Pyracmon vancouverensis, *Hargtn.*—Type ♀ in my coll.

Banchus superbus, *Cress.*

Banchus polychromus, *Prov.*—Two ♀s. Provancher's type not seen, but it seems undoubtedly, from description, to be a somewhat immature example (in which the black is not fully developed) of this well-marked yellow and black species.

Mesoleptus fasciatus, *Prov.*—♂ described from coll., Taylor.

Phobetes canadensis, *Hargtn.*—Type ♀ in my coll.

Mesoleius latus, *Cress.*—♂ described from V. I. coll., H. Edw.

Mesoleius truncatus, *Prov.*

Mesochorus truncatus, *Prov.*—♀ described from coll., Taylor.

Tryphon communis, *Cress.*—Two ♂s.

Syrphoctonus agilis, *Cress.* (*Bassus*).—Three ♀s.

Syrphoctonus pacificus, *Cress.* (*Bassus*).—♂ described from V. I. coll., H. Edw.

Coleocentrus occidentalis, *Cress.*—♀ described from same coll.

Rhyssa persuasoria, *Linn.*—One ♂.

Ephialtes pacificus, *Hargtn.*—Three types ♀ and one ♂ in my coll. The male is a very small specimen.

Ephialtes thoracicus, *Cress.*—♀ described from V. I. coll., H. Edw.

Ephialtes tuberculatus, *Fourc.*—Two ♀s.

Ephialtes vancouverensis, *Hargtn.*—Type ♀ in my coll.

Theronia fulvescens, *Cress.*—Fourteen ♀ and four ♂ specimens. A common insect, infesting *Clisiocampa*, *Orgyia*, *Menapia*, etc.

Pimpla atrocoxalis, *Cress.*—One ♀. From Clisiocampa.

Pimpla conquisitor, *Say.* Two ♀s.

Pimpla ellopiae, *Hargtn.*—Types ♂ ♀ in my coll. Bred by Fletcher from pupæ of *Ellopia somniaria*, a moth of which the larvæ are most destructive to the foliage of oaks.

Pimpla inquisitor, *Say.*—Four ♀s. Apparently the *P. indigatrix* of list published by Taylor.

Pimpla pedalis, *Cress.*—One ♀.

Pimpla sanguinipes, *Cress.*—Four ♀s.

Pimpla tenuicornis, *Cress.*—One ♀.

Polysphincta texana, *Cress.*—Two ♀s.

Glypta erratica, *Cress.*—One ♀.

Arenetra pallipes, *Hargtn.*—Five types ♂ in my coll. Common at Victoria in March, April and May. Four ♀s received by Mr. Fletcher.

Cylloceria occidentalis, *Cress.*—Two ♂s.

Lampronota Edwardsii, *Cress.*—One ♀. This was labelled *Coleocentrus rufus*, Prov., and was entered under that name in Taylor's list. The species was described from ♀ in V. I. coll, H. Edw.

Lampronota pleuralis, *Cress.*—One ♀.

Lampronota segnis, *Cress.*—♀ described from V. I. coll., H. Edw.

Lampronota vivida, *Cress.*—♂ described from same coll.

Xorides occidentalis, *Cress.*—♀ described from same coll.

Euxorides vancouverensis, *Prov.*—The type ♀ was from Taylor's collection. Not seen.

Xylonomus insularis, *Cress.*—♀ described from V. I. coll., H. Edw.

Aplomerus tibialis, *Prov.*

Platysoma tibialis, *Prov.*—One ♀ labelled as found under loose bark. The type ♀ was also collected by Taylor.

Ecthrus abdominalis, *Cress.*—One ♀. Specimen also in coll. Geological Survey.

Ecthrus (?) *maurus*, *Cress.*—♀ described from V. I. coll., H. Edw.

BRACONIDÆ.

Bracon atripectus, *Ashm.*—Three ♀ and one ♂ specimens. The latter was labelled as type of *Bracon bisignatus*, *Prov.*, but no description appears to have been published.

Bracon sanguineus, *Ashm.*—Two, ♀ ♂.

Doryctes pacificus, *Prov.*

Phylax pacificus, *Prov.*, *CAN. ENT.*, Vol. XVII., p. 117, ♀; *Phylax niger*, *Prov.*, *ibid.*, ♂.—Five ♀ and one ♂ specimen, which are considered by Ashmead to belong to the same species.

Microdus sanctus, *Say.*—One ♀.

Helcon frigidus, *Cress.*—One ♀.

Macrocentrus mellipes, *Prov.*—One ♀.

CHALCIDIDÆ.

Diomorus (?) *Zabriskii*, *Cress.*—One ♀.

Meraporus sp.—Six specimens.

PROCTOTRYPIDÆ.

Mesitius vancouverensis, *Ashm.*—♀ described from coll., Taylor.

Anteon puncticeps, *Ashm.*—♂ described from V. I. coll., Wickham.

Polymecus vancouverensis, *Ashm.*—♀ described from coll., Taylor.

TRIGONALIDÆ.

Trigonalys canadensis, *Hargtn.*—Type ♂ in my coll.

A NEW SPECIES OF PROTANDRENA, CKLI.

BY S. N. DUNNING, HARTFORD, CONN.

Protandrena Cockerelli, n. sp.—♀. Length, 12 mm.; shining black. Upper half of clypeus, lower portion of supraclypeal area, and part of side pieces, bright yellow, all forming a band across the face one-half broader than high, and of equal breadth throughout, knees yellow spotted. Head rounded, broader than high, and covered with a short growth of gray hair, longer on cheeks and thickest at base of antennæ; lower half of clypeus and two small dots near lower edge of band black, not deeply or closely punctured; antennæ black at base, becoming brown towards

the tip ; first joint of flagellum not quite as long as the second and third combined ; mandibles black ; vertex deeply but not very closely punctate. Thorax covered with gray hair, quite thick below and anteriorly ; mesothorax before deeply and a little more thickly punctured than vertex anteriorly, and the scutellum more largely but less closely punctate ; postscutellum similar to anterior mesothorax, while the metathorax is quite finely and closely punctate ; below the wings the thorax is closely and roughly punctured ; tegulae and nervures rufous, the stigma with a light spot before ; wings hyaline, much clouded at tip, marginal cell truncate and strongly appendiculate. Abdomen with white basal hair bands ; first segment deeply but not thickly punctured ; second, third, and fourth not as deeply and more closely punctate ; fifth more deeply and quite roughly punctate, and with a heavy rufous hair band posteriorly ; abdomen below with long and not distinctly separated hair bands, more finely punctate than above. Legs hairy, all except first joint of anterior, and the last joint of the middle tarsi rufous ; hind tarsi black ; anterior spur one-half as long as first joint tarsi, middle spur two-thirds as long as first joint of middle tarsi, and lateral spurs shortest of all, rufous ; claws cleft with several teeth inside.

Described from one ♀ taken at Topeka, Kansas, in 1864, by Mr. J. E. Taylor, and numbered 1,043 in my collection. Prof. T. D. A. Cockerell (after whom I have named this species, as a slight token of respect and of my gratitude for his many favours) pronounces this to be a valid new species. I would adopt his table (as published on p. 92 of the *Annals and Mag. Nat. Hist.*, July, 1896) as follows :

A. Large species.

(1) Stigma ferruginous.

(a) Hairy, tegulae rufous, knees yellow *Cockerelli*, Dun.

(b) Not so hairy, tegulae yellow spotted, 4 anterior knees yellow *mexicanorum*, Ckll.

(2) Stigma dark *asclepiadis*, Ckll.

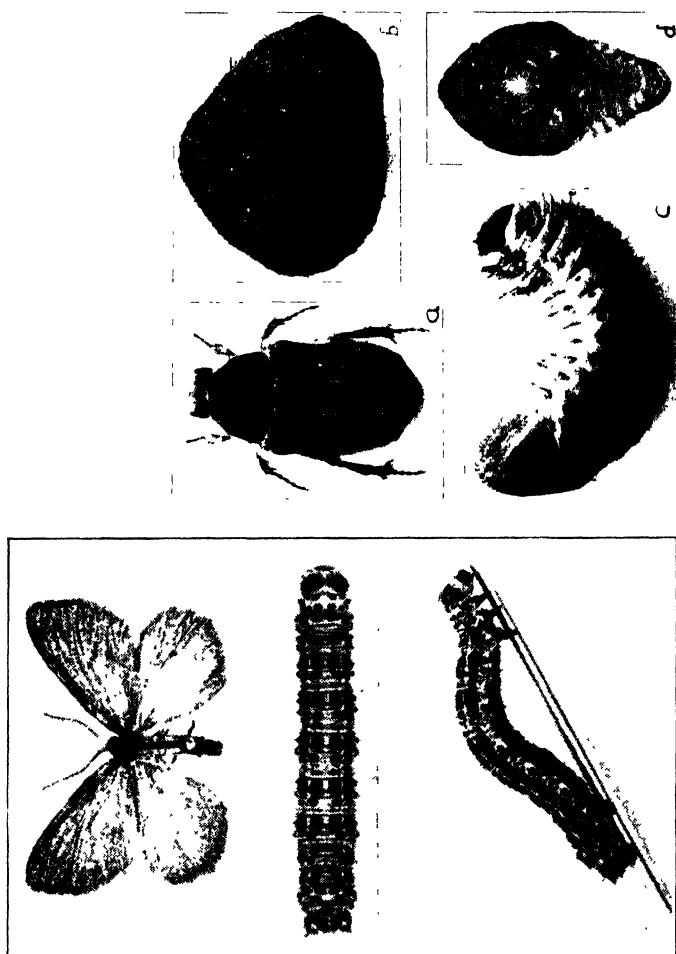
B. Small species.

(1) Tarsi piceous in ♀.

(a) Postscutellum and metathorax brownish . . *maurula*, Ckll.

(b) Postscutellum and metathorax black *trifoliata*, Ckll.

(2) Tarsi rufous in ♀, yellowish-white in ♂ . . . *heteromorpha*, Ckll.



Figures 1-26. *Phaenocarpa* (Diptera: Tephritidae) larvae and pupae.

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THE BLUEBERRY SPAN-WORM (DIASCTIS INCEPTARIA, WALK.) AND THE BUMBLE FLOWER-BEETLE (EUPHORIA INDA, LINN.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

On May 20th, 1896, I received the following letter from a correspondent in Mount Vernon, N. H.: "I enclose you worms that are making sad havoc with the blueberry crop in this section. They seem to be great feeders, completely stripping the bushes of leaves and blossoms, but do not touch the green berries after they begin to form. The berry fields look as though a fire had passed over them, and the worms have nearly ruined the blueberry crop in this vicinity.

"This blueberry (*Vaccinium pennsylvanicum*) needs no cultivation, only to burn over the old bushes every few years, when the new bushes will shoot up and bear the following year. There are hundreds of acres of land producing these berries in this and neighbouring towns, and so far as I can learn, about three-fifths of the crop has been destroyed by the worms."

Accompanying the letter were four nearly full-grown span-worms and one pupa. The larvæ were new to me, and their ravages described above also made them interesting from an economic standpoint. One was therefore photographed, about three times natural size; both dorsal and lateral views of it are shown on the plate. When full-grown the larvæ measure about five-eighths of an inch in length and are peculiarly marked, as the figures show. The general colour of the body is light yellowish-purple. The dark portions are of a dead black colour. The sutures of the head are broadly margined with white, and a broad white band crosses the sides of the head. The mesal stripe on the dorsum is light yellow, as is also the narrow stripe extending along the subdorsal region through the large black areas. The broad stigmatal stripe is light orange-yellow, whitish below each large black area. Spiracles black. The large black subdorsal areas are in a broad light purplish stripe. The body is sparsely

clothed with black hairs. The true legs are black, with yellow bands at the extremities of the joints. Venter yellowish, tinged with purple.

On May 22nd, one of the larvæ changed to a pupa on the soil in my cage. The worms would not eat the currant leaves placed in the cage. The pupa is of a very dark, shining brown colour, with the abdomen a little lighter and sparsely punctate.

As the other pupa and the larvæ had all died, the pupa just described was watched with much interest daily. At last, on the twelfth day (June 4), a dainty, modest little Quaker-gray moth emerged. It is shown, twice natural size, on the plate. About the only noticeable markings on the wings are one or two blackish spots on the costa of each front wing. The antennæ are quite strongly pectinated. The moth was at once sent to Mr. Hulst, who determined it as *Diastictis inceptaria*, Walk. In an illustrated communication to the "Rural New-Yorker" for July 25, 1896, I proposed that the insect be popularly known as the "Blueberry Span-worm," in recognition of its destructive work on that plant.

The moth was first described in 1862 (Cat. Brit. Mus., XXVI., 1667), from a Canadian specimen in the Urban collection. Dr. Packard again described it as *argillaccaria* in 1874, this name was found to be synonymous with Walker's earlier name, *inceptaria*, by Mr. Moffat, as recorded by Mr. Hulst (Ent. News, VI., p. 11, 1895). Dr. Packard records the moth from Maine, Massachusetts, Pennsylvania, and Canada (Mon. of Geom., p. 258). He states that "it is very abundant in pine woods in Maine on a dry soil, rising and fluttering with rather a feeble flight, and soon settling again. In July, 1874, I captured thirty males before securing a female; the latter are apparently less ready to fly."

Heretofore nothing seems to have been known of the early stages of this Geometrid. Whether there is more than one brood of the caterpillars is not known. Doubtless the practice of burning over the blueberry fields every few years greatly checks the pest. The larvæ will probably quickly succumb to a Paris green spray, and a little united effort among those interested would soon control this blueberry span-worm.

THE BUMBLE FLOWER-BEETLE (*Euphoria inda*, Linn.).

This yellowish-brown beetle, with its wing-covers sprinkled all over with small, irregular black spots (shown at *a* on the plate, twice natural size), is our most common flower-beetle in the North. "It is one of the first insects to appear in the spring. It flies near the surface of the ground,

with a loud, humming sound, like that of a bumble bee, for which it is often mistaken. During the summer months it is not seen, but a new brood appears about the middle of September. The beetle is a general feeder, occurring upon flowers, eating the pollen; upon cornstalks and green corn in the milk, sucking the juices; and upon peaches, grapes, and apples. Occasionally the ravages are very serious.' (Comstock's Manual for the Study of Insects, p. 565.)

Although this beetle is so common, and has been known for more than a hundred years, nothing was recorded of its earlier stages (beyond the fact that it occurred in its various stages in the nests of ants) until December, 1894. Then Mr. Chittenden (Insect Life, VII., 272) recorded the rearing of the beetle from larvæ found in manure on Long Island. When found, July 9th, the larvæ were encased in cocoons, and the last week in August these cocoons contained living adults.

On June 19th and July 8th, 1896, I received a large number of grubs from Mt. Kisco, N. Y. They were found in a manure pile that had not been disturbed since the preceding August, and from the soil beneath another pile made in October and moved in the following April. One of these grubs is represented, twice natural size, at *c* on the plate. When compared with a white grub (*Lachnosterna*, sp.), it was found to be considerably shorter and thicker-set; its legs were not more than one-half as long, and its head was also much smaller than that of the white grub. The dull leaden hue of the body, due to the contents of the food-canal, indicated that its food consisted of dead vegetable matter rather than living roots, as in the case of the white grub. When they were placed on their feet or venter, they would crawl an inch or so and then roll over and crawl with considerable rapidity, with a wave like motion, on their backs. I also found several similar grubs in a pile of rotting sod and manure which had not been disturbed for a long time. I have seen no evidence of their eating the roots of living plants.

The grubs were placed in cages containing rotting sod and manure, in which they quickly buried themselves. Twenty days later, July 28th, the grubs had changed to pupæ in earthen cocoons of the somewhat peculiar and definite shape shown, twice natural size, at *b* on the plate. Evidently the grub forms an earthen cell in the soil by rolling and twisting about, and then cements together the particles of earth composing the walls of the cell so as to form an earthen cocoon, which retains its form

when removed from the soil. Each cocoon has a curious roughened or more granular spot on one side (the upper side in the figure).

The white pupa is shown, twice natural size, at *d* on the plate. In pupating, the larval skin is shed off the anal end in the same manner as caterpillars do. In the case of the Spotted Pelidnota (*Pelidnota punctata*), however, the larval skin splits down the whole length of the back, retains the larval shape, and forms a covering for the pupa, which remains inside.

On August 13th, or sixteen days after pupæ were found in the cages, several beetles emerged. They continued to appear daily until September 10th; more (33) emerged on August 22nd than on any other day. They proved to be *Euphoria inda*, Linn.

This bumble flower-beetle evidently feeds only on decaying vegetable matter, as rotting sod or manure, and is thus destructive only in the beetle state. The beetles seem to do most of their injury soon after they emerge in the early fall. One correspondent wrote me that he collected forty-five of the beetles in one day on a single ripe peach. Doubtless the beetles hibernate, but whether egg-laying takes place in the fall or spring is not known. The fact that manure piled in August and October contained many nearly full-grown grubs the next June indicates that the eggs are laid and hatched in the fall, otherwise the grubs must develop very rapidly after hatching from eggs laid in the spring. There seems to be one brood of the insect in the course of a year. Hand-picking of the beetles is apparently the most practicable method of combating it when it is found working on ripe fruits or on green corn.

Since the above was written, some further notes on this insect (read by Dr. Lintner at the Buffalo meeting of A. E. C. last August) have been published. Larvæ were sent to Dr. Lintner in chip manure in the latter part of June. On August 8th two beetles had emerged in his cage, and an examination of the earthen cells revealed other beetles and several pupæ. An instance is given which seems to indicate that there is a possibility that the grubs may have attacked growing corn, but the evidence is not conclusive.

BUTTERFLIES OF NORTH AMERICA.—Mr. Edwards is about to publish the last Part, the seventeenth, of the third volume of this magnificent work. It will contain three plates, illustrating *Chionobas Iduna*, California, *Oeno*, Varuna and Alberta, with their early stages, and the imago of *C. Peartia*. There will also be accounts of *Papilio Brucei* and *Ajax*, *Neophasia Menapia*, and *Colias Eriphyle*; and supplementary notes on a large number of other species, with title page and index.

DESCRIPTIONS OF SOME NEW GENERA AND SPECIES OF
CANADIAN PROCTOTRYPIDÆ.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The following new genera and species of Proctotrypidæ were all collected in Canada by Mr. W. Hague Harrington, of Ottawa.

SCORPIOTELEIA, gen. nov.

Abdomen with five visible segments ; the last three segments long, slender, cylindrical, together as long as the second, and resembling the terminal segments of a scorpion ; the third segment is about as long as the fourth and fifth segments united, the fifth pointed. Front wings with the marginal vein shorter than the marginal cell, and scarcely twice as long as the first abscissa of radius, which is slightly oblique. Antennæ 15-jointed, filiform, the first joint of flagellum the longest, about half the length of the scape, the following joints to the last very gradually shortening, the penultimate joint being about twice as long as thick, the last joint oblong-oval, one-half longer than the preceding.

(1) *Scorpioteleia mirabilis*, sp. n.

♀.—Length, 4 mm. Smooth, shining, pubescent ; head and thorax black, collar and prosternum brownish ; petiole and the large second abdominal segment brownish-piceous, the three terminal segments yellowish ; mandibles, legs and basal four joints of antennæ ferruginous, the flagellum blackish towards apex ; palpi yellowish.

The mesonotal furrows are deep, distinct ; the scutellum has a large, deep fovea across the base ; while the metanotum is smooth, tricarinate, with the posterior angles subdentate. Wings hyaline, pubescent, the tegulæ yellowish, the veins broad. Abdominal petiole longer than the metathorax, a little thicker towards base than at apex, striated, about three times as long as thick, rest of abdomen smooth, polished.

Hab.—Kettle Island, in Ottawa River, August 18, 1894.

STYLIDOLON, gen. nov.

Abdomen with six visible segments, the body of same being long and very slender, twice as long as the petiole, and gradually acuminate toward apex, which has a gentle upward curve ; the second segment is scarcely longer than the petiole, the dorsum of same triangularly emarginated at apex ; the third segment dorsally, on account of the emargination in the second, a little longer than the fourth and fifth, but ventrally it is not longer than these two segments united ; the fifth is shorter than the fourth ; the sixth is conically pointed, a little longer than the third. Front

wings with the marginal vein as long as the marginal cell, or about $2\frac{1}{2}$ times as long as the oblique first abscissa of radius. Antennæ 15-jointed, filiform, the first joint of flagellum about two-thirds the length of the scape, the following joints to the sixth gradually shortening; joints 7 to 11 much shorter, subequal, about twice as long as thick; the 12th very little longer than thick, the last joint thicker, ovate, nearly as long as the two preceding united.

(2) *Stylidolon politum*, sp. n.

♀.—Length, 3.5 mm. Polished black, shining, pubescent; tegulæ, scape and pedicel ferruginous, the flagellum black or brown-black. Wings hyaline, the veins dark brown. Legs rufous, the articulations paler or yellowish, the hind coxæ black or piceous black.

Hab.—Ottawa, May 13, 1896.

MIOTA, Forster.

(3) *Miota rufopleuralis*, sp. n.

♀.—Length, 2 mm. Polished, shining, pubescent; head black; dorsum of thorax and body of abdomen, except the tip, brown-black or piceous; mandibles, collar, sides of thorax and beneath, rufous; palpi, scape, pedicel, legs and petiole of abdomen, yellowish.

The antennæ are shorter than the body, the flagellum being brown-black; scape as long as flagellar joints 1 to 4 united, the first flagellar joint the longest, not more than thrice as long as thick, the joints beyond very gradually shortening, the three or four penultimate joints only a little longer than thick, the terminal joint conical, only a little longer than the preceding joint. Wings hyaline, the tegulæ yellowish, the veins brownish, the marginal vein very short, only a little longer than the first branch of the radius, or scarcely one-third the length of the radial cell.

Hab.—Hull, P. Q., August 14, 1894.

(4) *Miota Canadensis*, sp. n.

♀.—Length, 2.5 mm. Polished black; first three joints of antennæ, the tegulæ and legs brownish-yellow; palpi white.

The antennæ are not quite as long as the body; scape as long as flagellar joints 1 to 3 united, the first flagellar joint the longest, more than four times as long as thick; flagellar joints 7 to 12 hardly longer than thick. Wings hyaline, the veins brownish-yellow, the marginal vein about three times as long as the first abscissa of radius, or as long as the marginal cell.

Hab.—King's Mountain, Chelsea, P. Q., August 12, 1894.

ZELOTYPA, Forster.

(5) *Zelotypa fuscicornis*, sp. n.

♂.—Length, 2.5 mm. Polished black, pubescent; antennæ longer than the body, fuscous, the scape hardly as long as the pedicel and first joint of flagellum united, the latter excised at basal one-half. The flagellar joints 2 to 11 subequal, about four times as long as thick; legs brownish-yellow, the hind coxæ black. Wings hyaline, the veins brown, the marginal vein hardly two-thirds the length of the marginal cell, or about one and a half times as long as the first abscissa of the radius. Petiole of abdomen rather stout, about two and a half times as long as thick, coarsely fluted.

Hab.—Hull, P. Q., July 23.

PANTOCLIS, Forster.

(6) *Pantoclis Canadensis*, sp. n.

♀.—Length, 2 mm. Polished black, pubescent, the body of abdomen more or less brownish piceous; antennæ, except the 7 or 8 terminal joints, and legs, brownish-yellow.

The scape is about as long as the first six joints of the flagellum united, the first joint of flagellum being a little longer and more slender than the pedicel, or about twice the length of the second joint; all joints of the flagellum, except the last, are submoniliform and gradually become thicker and broader, the six penultimate joints being a little wider than long, subpedunculate; the last joint is conical, a little longer than the preceding. Wings subhyaline, the veins dark brown, the radial cell rather small, triangular, a little longer than the oblique first abscissa of radius. Petiole of abdomen scarcely twice as long as thick, opaque, coarsely fluted.

Hab.—Ottawa, August 13, 1894.

(7) *Pantoclis similis*, sp. n.

♂.—Length, 2.6 mm. Polished black, pubescent; two basal joints of antennæ, the palpi, the tegulæ and the legs, including all coxæ, brownish-yellow.

The antennæ are shorter than the body, the scape being about as long as the pedicel and first joint of flagellum united; flagellum brown-black, the first joint the longest, not quite five times as long as thick, with the basal one-third strongly excised, the following subequal, but very gradually shortening, so that the three terminal joints are scarcely two and a half times as long as thick. Wings hyaline, the veins brownish,

the marginal vein about two-thirds the length of the marginal cell, or one-half longer than the oblique first abscissa of radius. Petiole of abdomen stout, two and a half times as long as thick, fluted.

Hab.—Russell's Grove, Hull, P. Q., August 5, 1894.

A NEW WATER-BUG FROM CANADA.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The interesting new species of water-bug described below was received some time ago from Abbé P. A. Bégin, of Sherbrooke, Canada. It was captured swimming on a fresh-water stream some little distance above Sherbrooke, and is of more than ordinary interest, from the fact that it belongs to the genus *Halobatopsis*, Bianchi*, a genus not yet recognized in the North American fauna, and only recently characterized, being based upon the South American *Halobates platensis*, Berg., also a fresh-water species.

Halobatopsis Béginii, n. sp.

♀.—Length. 2.3 to 2.5 mm. Oval, velvety black; a yellow dot or spot on middle of pronotum anteriorly, a larger, somewhat triangular, yellow spot, but more or less variable in shape and size, on the upper basal hind angle of the mesopleura close to the base of the metapleura, while beneath, the mesosternum anteriorly and posteriorly and along the median furrow or suture is more or less broadly margined with yellow. Antennæ scarcely two-thirds the length of body; the first joint subclavate, slightly curved, shorter than the three following joints united, but distinctly longer than joints 2 and 3 combined; joints 2 and 4 subequal, longer than the third, the latter being about three-fourths the length of the second; the fourth or last joint is fusiform. The legs in all my specimens are broken, but are similar to those found in *Trepobates*, Uhler (= *Stephania*, White), the middle legs being much the longest pair. The anterior legs are very short, shorter than the body; the femora, with their trochanters, being about as long as the tibiæ and tarsi combined; the tarsi, consisting of only a single joint, being a little longer than half the length of tibiæ; middle legs very long, their femora alone being as long or even longer than the body, the tibiæ being fully one and a half times as long as the femora, the tarsi about half the length of tibiæ. The hind legs in all my specimens are broken, but the femora, which alone remain, are much slenderer and considerably longer than those of the middle pair.

Hab.—Sherbrooke, P. Q., Canada. Dedicated to Abbé P. A. Bégin, the discoverer of the species and a most valued correspondent.

*Ann. Muséum Zool. l'Acad. Imp. des Sci. de St. Petersburg, 1896, p. 70.

MAMESTRA CIRCUMCINCTA, SMITH.

BY JOHN B. SMITH, SC. D., NEW BRUNSWICK, N. J.

The above species was described by me in the Proceedings of the U. S. National Museum, Vol. XIV., page 253, in my revision of the genus *Mamestra*. Recently Mr. Grote has questioned the distinctness of this species from *olivacea*. I could hardly credit this as being serious, and barely referred to the matter in the September, 1896, number of the CANADIAN ENTOMOLOGIST, page 240. In the December number, page 301, Mr. Grote returns to this subject, and again suggests that *circumcincta* may be either *olivacea* or *comis*. He refers to the fact that the description resembles that of both the species cited by him, and brings in Mr. Beutenmüller to testify to the fact that my species closely resembles *olivacea*. Mr. Beutenmüller is not a specialist in the Noctuidæ, and not entitled to an opinion that would carry decisive weight. Furthermore, it was not fair to Mr. Beutenmüller to ask him to make the comparison without first referring him to my description. Mr. Grote speaks as if the statement that *circumcincta*, or its description rather -- for he has never seen the species -- resembles *olivacea* was an important one and a discovery of his own. He does not refer to the fact that in my description I say: "the male resembling *olivacea* so strongly that I compared it closely at first, expecting a variety of this protean form." It seems to me it would be impossible to state more definitely the fact that I recognized the very close resemblance, superficially, between the species newly described by me and the very variable one long ago characterized. Mr. Grote also omits entirely the fact that the last sentence in the description and my comment on it reads: "The sexual characters, however, refer the species to the *renigera* group." On plate X., accompanying my paper, I delineate the sexual structures of *circumcincta* at figure 52, and of *olivacea* at figure 53. The two are so utterly different that it is simply impossible that one type should be a modification of the other. My species is, therefore, based upon a structural character primarily, and after that upon colour and markings. Now, if Mr. Grote will claim that these structural characters are not of specific value, then the question of whether my species may be *olivacea* is open for discussion. Until he takes this stand, these two species cannot be compared for a moment whatever their superficial similarity may be. I have asserted time and again that differences in sexual structure invariably indicate differences in species. Many other Entomologists have taken the same stand. Mr.

Grote has not, so far as I know, taken any stand in the matter, except so far as to deny the value of these characters for generic separation. If he is willing to assert that these structures have no specific value, then the question is an open one; but I submit that to bring the matter before the readers of the CANADIAN ENTOMOLOGIST, as if there was a mere matter of colour and marking to be considered, is neither scientific nor honest. Before suggesting the identity of the two species he should have referred to the fact that I recognized their superficial resemblance, and separated them upon a distinct structural character.

One other point in Mr. Grote's paper is worth noting. In the matter of *Agrotis crassa*, Mr. Grote excuses his failure to recognize the true character of the frontal structure by stating that neither he nor the Museum with which he is connected possesses a microscope. He does not distinctly say so, but it would seem as if neither did they possess an ordinary hand lens of from $\frac{1}{2}$ to $\frac{3}{4}$ inch focal length, which is all that is necessary to recognize external structures of Noctuid moths serving for the division of genera. If not even the simplest and most necessary appliances for study are at hand, is any man justified in making assertions on points concerning which he cannot have any possible certainty? But even without the optical assistance to which I have referred, surely either Mr. Grote or the Institution at Hildesheim has in its possession a little camel's-hair brush, and with this, or even the frayed end of an ordinary wooden toothpick, the scales from the front can be sufficiently removed to enable one to recognize the frontal structure with the unassisted eye. One who makes assertions as to structure, should at least take every means within his power to make certain that they are accurate. Mr. Grote evidently has not done this, and in every assertion that he has made, concerning the identity of genera in this *Feltia* matter, I have proved him wrong. To escape from the necessity of considering his genus *Carneades* a synonym of *Agronoma*, he seems now to be willing to recognize the distinctness of the division that I have called *Porosagrotis*, basing it, however, upon the fact that the antennæ in the typical species are pectinated. This he considers a good generic character, differing in that point from all the authors who have written on this genus. Unfortunately, the genus *Carneades* contains species with antennæ pectinated and antennæ serrated, and so also does the genus that I have called *Porosagrotis*. There is no line of distinct demarcation between these two types of antennal structure, so that I could not utilize them even for

divisions within the genus. The ordinary type of antenna in *Carneades* is what Mr. Grote has called brush-like, and consists of joints with more or less marked lateral projections, bearing on all sides stiff, bristly hair. It is the form that is called "bristle-tufted" by other authors. The lateral projections vary in size in the species, and when they become evident to the naked eye the antenna is called pectinated. The pectinations may be long or short, and the distinction between a shortly-pectinated antenna and one that is merely "brush-like" is entirely a matter for the individual judgment of the author who uses the term, as the two forms grade into one another imperceptibly. Mr. Grote cannot escape either admitting that the sexual character that I have made use of to separate *Porosagrotis* is a good one for the generic purposes or admitting that *Agronoma* must supercede *Carneades*. It does not make any difference to me which he chooses, because it does not distress me, as Mr. Grote says it does him, to have any name proposed by me relegated into the synonym, whenever there is scientific cause for it set forth by one whose methods of work and accuracy of research entitle him to the confidence of those for whom he writes.

MONODONTOMERUS IN APPALACHIA.

BY W. H. PATTON, HARTFORD, CONN.

MONODONTOMERUS SIGMA (Fabr.).

M. virideneus, Prov., Canada.

Common in New England. In the District of Columbia I have reared it from the cell of *Melitoma euglossoides*, var. *taurea*, Say.

The genus *Oligosthenus* cannot remain separated, the fine dentitions of hind femora being more or less indistinct.

A frequent variety has no cloud about stigma. The abdomen varies in the amount of purple.

A male taken by me at Hartford, Conn., Aug., 1895, differs decidedly from the male of *M. montivagus*, Ashm., described by Mr. Cockrell in the CAN. ENT., XXVIII, 127, May, 1896. My male measures 3 mm. in length. It has no cloud about stigma; the abdomen is purple, except apex and most of the first segment. The scape is slender, as in the female; the flagellum is as in the female. Hind coxæ and femora much more swollen than in the female, tooth longer, no denticulations. The abdomen is short, broad; dorsum flat, shining. The descriptions of the females do not differ specifically.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXI. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC — (*Concluded*).

Tribe X.—HISPINI.

The form alone of these little beetles is amply sufficient for their separation from the other tribes of Chrysomelidæ. They are more or less wedge-shaped, the elytra often broadly and squarely truncate behind and with rows of deep punctures, sometimes costate as well. Only two of the North America genera have been recorded from our territory, *Microrhopala*, with 8-jointed antennæ (owing to the fact that the last four joints are closely connate), and *Odontota*, in which the antennæ are 11-jointed. The middle tibiæ are straight in both of these genera.

MICRORHOPALA, Chev.

- A. Elytra with only eight series of punctures.
 - b. Head usually red, thorax red, elytra blue-black with side margin and discal vitta red. .21-.25 in. *vittata*, Fabr.
 - bb. Head, thorax and elytra unicolorous (bluish, greenish or bronzed). Punctures of the outer rows of elytra larger than inner. .20 in. *excavata*, Newm.
 - Punctures of outer rows like those of the inner. .22-.25 in. *cyanea*, Say.
- AA. Elytra with more than eight series of punctures on a part of their length, the fourth interval bearing four rows near the apex. Form more elongate. .12 in. *porcata*, Mels.

ODONTOTA, Chev.

- A. Elytral punctures in ten rows; more or less distinctly costate.
 - Elytra reddish or yellowish, with black sutural stripe. .24-.26 in (fig. 10) *dorsalis*, Thunb.
 - Elytra blackish, humeri sometimes reddish.
 - Body beneath black, thorax in part and humeri of elytra red. .22-.28 in. *scapularis*, Oliv.
 - Body beneath and thorax red, elytra black. .24 in. *bicolor*, Oliv.



FIG. 10.

Elytra rosy or reddish yellowish, much broader at apex, and with serrate, explanate margin, the disc indistinctly marked with

- dark spaces. Under surface variable in colour, thorax coloured like the elytra. .24-.26 in. *rubra*, Web.
- AA. Elytral punctures in eight rows, costæ acute. Colour variable, usually with head dark, thorax and elytra pale with dark spots of irregular shape. .15 in. *nervosa*, Panz.

Tribe XI. CASSIDINI.

These are the "tortoise beetles" or "helmet beetles" found on morning glories and other convolvulaceæ. They are easily recognized on account of the peculiar form, which is circular or elliptical in outline, the upper surface convex, the margins of elytra and thorax explanate (to a varying degree), the head concealed. Some of them, notable *Coptocycla aurichalcea*, which, with its larva, is often abundant on the morning glory, are of most brilliant golden and greenish tints when alive; these, however, being lost at or after death. The three genera found in Canada are as follows:

Size large (.38-.46 in.), form more elliptical.

Head partially exposed, thorax and elytra spotted... *Chelymorphia*.

Head entirely covered, thorax spotted, elytra plain... *Physonota*.

Size small (.20-.30 in.), head entirely covered, antennæ longer than thorax..... *Coptocycla*.

COPTOCYCLA, Chev.

Three species are recorded, one of which, *C. clavata*, Fabr., is easily known by its size (.30 in.), the brown elytra, which are roughened and gibbous, and the transparent spot on the middle of the outer margin. It occurs on the "ground cherry." The others have the elytra nearly even without gibbositities, and are closely allied. Mr. Crotch separates them by the fact that in *aurichalcea*, Fabr., the body beneath and the last four joints of the antennæ are black, while in *guttata*, Oliv., the sides of the body beneath are reddish and the last two joints of the antennæ are black. Both are of about the same size, a trifle under a quarter of an inch in length.

PHYSONOTA, Boh.

A rather large insect of a greenish or pale yellow colour, the thorax spotted, the principal and most constant spot being a large one near the middle. Two others are usually present near the base. Elytra not maculate. It is described by Say as *P. unipunctata*.

CHELYMORPHA, Chevr.

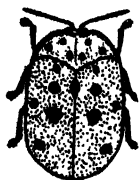


FIG. 11.

Represented by *C. argus*, Licht., of the size of the preceding species (.36-.48 in.), yellowish or reddish above, black beneath. Thorax with four black spots in a curved transverse row, behind which are often two others. Elytra usually with six black spots on each, arranged as shown in Fig. 11, and a common spot just posterior to the scutellum. Legs usually black. The prosternum is rather deeply longitudinally grooved and produced in front.

The following bibliography gives the names of the principal papers on the North American Chrysomelidæ; a few short articles have been omitted to economize space, since the genera have been treated in the more extended papers cited.

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- 1849.—Haldeman, S. S. Cryptocephalinorum Borealis Americae diagnosises. Jour. Acad. Nat. Sci., N. S., I.; Proc. Acad. Nat. Sci., IV.
- 1852-1854.—Suffrian, F. Monographie und kritisches Verzeichniss der Nordamerikanischen Cryptocephaliden. Linnæa Entom., VI. and VII.
- 1856.—Rogers, W. F. Synopsis of the species of Chrysomela and allied genera inhabiting the United States. Proc. Acad. Nat. Sci., VIII.
- 1862-1865.—Stål, C. Monographie des Chrysomelides de l'Amérique. Upsal.
- 1865.—Leconte, J. L. On the species of *Galeruca* and allied genera inhabiting North America. Proc. Acad. Nat. Sci., Philadelphia.
- 1866.—Leconte, J. L. Practical Entom., II., p. 9 [*Prasocuris*].
- 1873.—Crotch, G. R. Material for the study of the Phytophaga of the United States. Proc. Acad. Nat. Sci., Philadelphia.
- 1880.—Leconte, J. L. Short studies of North American Coleoptera. Tr. Am. Ent. Soc., VIII. [*Cryptocephalini*].
- 1883.—Horn, Geo. H. Chrysomelidæ, Hispini. Miscellaneous notes and short studies of N. A. Coleoptera. Trans. Am. Ent. Soc., X.
- 1889.—Horn, Geo. H. A synopsis of the Halticini of Boreal America. Tr. Am. Ent. Soc., XVI.
- 1891.—Leng, Chas. W. Revision of the Donaciæ of Boreal America. Tr. Am. Ent. Soc., XVIII.

- 1892.—Horn, Geo. H. Studies in Chrysomelidæ. Tr. Am. Ent. Soc., XIX.
1892.—Horn, Geo. H. The Eumolpini of Boreal America. Tr. Am. Ent. Soc., XIX.
1893.—Horn, Geo. H. The Galerucini of Boreal America. Tr. Am. Ent. Soc., XX.
1896.—Linell, M. L. A short review of the Chrysomelas of North America. Jour. N. Y. Ent. Soc., IV.

Since the note on the genus *Zeugophora* was printed (on p. 73 of the previous volume) two other species have been received from Mr. R. J. Crew, of Toronto: *Z. Kirbyi*, Baly (*Reinecke*, Grote), which is uniformly yellowish above, and *Z. scutellaris*, Suffr., in which the head and thorax are entirely yellow, while the elytra are black, with large punctures, separated by more than their own diameters. Collectors should be on the lookout for *Z. consanguinea*, Cr., which differs from *scutellaris* in having the occiput black, while the elytral punctures are close. It is known to me from Wisconsin, Illinois, and Manitoba.

Attention should be called to a clerical error in the table of *Chrysomela*. The name *labyrinthica* should read *pnirsa*. Dr. Leconte is said to have distributed it under the manuscript name of *labyrinthica*, and in thinking of it by this characteristic cognomen the error was committed.

ON THE MEXICAN BEES OF THE GENUS AUGOCHLORA.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In the Transactions of the American Entomological Society, XX., 147, after notes and descriptions of five species of *Augochlora*, I gave the following note: "All of the species of *Augochlora* mentioned above agree in having the hind spur serrate with numerous fine teeth, and form a distinct section of the genus. Another section, to which belong *A. lucidula*, Sm., *A. sumptuosa*, Sm., and *A. humeralis*, Ptn., is characterized by having this spur provided with four or five long teeth."

In the January number of this journal, XXIX., 4-6, Prof. Cockerell makes use of these distinctions—under more obscure terms, however—and has given special names to these sections, and that, too, without referring to my note. I have no objections to his giving names to the sections, however, for I have had ample opportunity to do so, if I had

desired. My note was intended for the use of students of these insects, and was given to call attention to the form of the hind spur, the importance of which was not indicated in the descriptions because all of these had the spur of the same form.

It is nothing new to me to hear that the males of *A. viridula* and *A. fervida* have the hind spurs different from the females. Indeed, I have never supposed that the spurs of the males of *Halictus* and *Augochlora* presented any important characters, though, as a rule, I have mentioned the form of the hind spurs in the descriptions of the females.

In Trans. Am. Ent. Soc., XXII., 118, I indicated *A. lucidula*, Sm., as a synonym of *A. viridula*, Sm. I intended to confirm Patton's view that the former was the female of the latter, and cited the place where he had expressed it. As regards the synonymy of *A. fervida*, Sm., and *A. humeralis*, Ptn., the description of the male of Patton's species is the only thing which leaves any doubt in my mind. I think they are the same, however. Two of my specimens have the tarsi pale testaceous, while a third has all except the basal joint dark, seeming to connect the typical *A. fervida* ♂ with the male described by Patton. I have no doubt at all about what I have identified as *A. humeralis* being the female of *A. fervida*, and that is all I have said about it.

The females of the first division do not have the spurs "ciliate or simple," but serrate with numerous fine teeth. The spurs are to be distinguished mainly by the number and length of the teeth, a fact which is obscured by the terms "ciliate" and "pectinate." The females of the second group have the spurs with only four or five long teeth.

It is one thing to use these characters in separating the species, and quite another to found named sections upon them before it is shown that they are valid indications of relationship throughout the genus. If we assume that *Augochlora* is a genus distinct from *Halictus*, or even a natural section of that genus, we must admit that the form of the hind spur is a case of parallel modification, and no proof of affinity. Otherwise, we must subdivide each genus and rearrange the species according to the form of the spur. In *Halictus*, I am satisfied that some species with few-toothed spurs are more closely related to species with finely serrate ones than to some species whose spurs are more like their own. Judging from analogy, we may expect to find the same thing in *Augochlora*.

NEW FORMS OF OSMIA FROM NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, N. M.

Osmia prunorum, n. sp.

♀.—Length, 9 mm.; shining dark greenish-blue, densely punctured with pale ochreous pubescence. Head subquadrate, face and front so densely punctured as to be cancellate; pubescence thin except on occiput; clypeus punctured just like the front, with no central keel, the anterior margin broadly dark purple, the edge straight and entire, two converging brushes of orange hair projecting from beneath it. Mandibles with the two lower teeth long and pointed. Antennæ rather short, flagellum only feebly brownish beneath. Thorax very closely punctured, not very densely hairy; basal triangle of metathorax minutely granular, its extreme base minutely longitudinally plicate. Tegulae black, shining, sparsely punctured. Wings hyaline, faintly dusky beyond the nervures, nervures black. Legs black, with pale brownish or grayish pubescence, rufescent on inner sides of basal joints of tarsi; hind femora quite broad at ends, basal joint of hind tarsi quite stout. Abdomen short, suboval, convex, shining, strongly but not very closely punctured, first joint covered with sparse long pale ochreous pubescence; remaining joints with a sericeous pile, only noticeable in certain lights, when it will take more or less the appearance of bands. Apex with snow-white hairs. Ventral scopa black in middle and yellowish-white at sides.

♂.—A little larger; face and clypeus densely covered with silky white pubescence; pubescence of thorax a deeper ochreous, especially on scutellum. Antennæ long, flagellum rufous beneath. Colour of head and thorax a decided olive green. Wings not dusky beyond the nervures. Pubescence of last four legs sparse and black. Middle tarsi ordinary. Pile of second and third abdominal segments pale ochreous, that of the following segments black except narrowly along hind margin of fourth. Sixth segment with a shallow median depression; its hind margin with a very distinct rounded emargination. Apex with two long black spines.

Hab.—Mesilla Valley, N. M.; 3 ♀, 1 ♂ at flowers of plum, College Farm, April 9 (Ckll.); 4 ♀, 1 ♂ at flowers of *Sisymbrium*, College Farm, April 12th (Ckll.). Resembles *O. distincta*, but easily known by the bicoloured ventral scopa. The ♂ seems to resemble that of *proxima*, which I have not seen. This species is apparently referable to the subgenus *Chalcosmia*, Schmeid.

Osmia phenax, n. sp.

♀.—Length, 9 mm. This so closely resembles *prunorum* that I had confounded it with it. It differs in the following particulars: Head and thorax olive green, clypeus strongly purple on the disc. Flagellum ferruginous beneath. Pubescence somewhat thinner, and entirely rather dull white. Tegulæ shining rufotestaceous. Wings faintly dusky all over. Abdomen duller, olive green with faint purple tints, punctures larger and closer. Ventral scopa thin and short, pale fulvo-ochreous, uniform in colour. Small joints of tarsi more or less rufescent.

Hab.—Mesilla, N. M., at flowers of honeysuckle, April 13, 1895 (Miss J. E. Casad). Also one taken some time ago at Las Cruces, by Prof. Townsend. Easily known by the colour of the tegulæ, which is very unusual for *Osmia*. A specimen was compared by Mr. Fox with the Cresson collection, and returned with the note: "Near *distincta*, colour paler, and wings clear throughout, tegulæ testaceous, punctures of dorsum stronger."

Osmia cerasi, n. sp. or var.

♀.—Length, 9½ mm.; stoutly built, very dark blue, greenish on vertex and dorsum of thorax, purplish on clypeus. Pleura sometimes black. This agrees with Cresson's description of *O. densa* in almost every particular, and may be only a southern variety of it; but it has the pubescence of the occiput and thorax above bright rust-red, as Cresson describes for *rustica*. The thorax is distinctly green anteriorly. The apical margins of the abdominal segments are dark blue, concolorous with the rest. Pubescence of pleura and face entirely black; ventral scopa black. Tegulæ black. Pubescence of abdomen short, black, except that on first segment, which is longer and pale fulvous. The punctures of the head and thorax are large, and about as close as it is possible for them to be; those of the abdomen are also close. Legs with black hairs.

Hab.—Mesilla, N. M., on flowers of cherry, April 14th, 1895 (Miss J. E. Casad); College Farm, Mesilla Valley, April 9th, 1895, on flowers of plum (Miss J. E. Casad). Also one taken at Las Cruces by Miss Agnes Williams (now Mrs. Herbert). The above three are all the species of *Osmia* observed in the Mesilla Valley.

NOTES ON EUPOEYA AND THE MEGALOPYGIDÆ.

BY HARRISON G. DYAR, NEW YORK.

I have had occasion to refer three times in these pages to the genus *Eupoeya*, placing it, with some doubt, in the *Megalopygidæ*. Very recently I have been so fortunate as to discover the larva in Florida on the mangrove. It is a true Euleid, contrary to my expectation, but in confirmation of Dr. Packard's original statements. This genus, then, removed from the *Megalopygidæ*, renders it possible to define the family by the branching of vein 1 of primaries, instead of by the pectinations of the antennæ to the tip, which proves to be a fallacious character.

Megalopygidæ.

If the family be defined on this character, it appears unfortunate that *Aurivillius* does not refer to it, nor show that part of the wing in the figures in his recent paper on the group. *Aurivillius* would place the African genera *Somabrachys* and *Psycharium* in the *Megalopygidæ*, which is interesting, if well founded, as extending the geographical distribution of the family to the Old World. (Iris, Dresden, VII., 189, 1894.)

In CAN. ENT., XXVII., 241 (1895), I referred eight genera to this family. *Eupoeya* may now be omitted, but *Alimera bicolor*, Moschl., may probably be added. Recently Grote doubted (CAN. ENT., XXVII., 136) the correctness of Berg's union of *Lagoa* with *Megalopyge*. Moschler had previously expressed the same opinion (Abh. Senek. Naturf. Gesell., XVI., 122) and stated that *nuda*, the type of *Megalopyge*, differs in antennal characters. "Die Fühler von *nuda* sind kurz. kaum halb so lang wie die Vorderflügel, beim ♂ an der Spitze ausserst kurz gekammt, während dieselben bei *crispata* länger als der halbe Vorderflügel, starker und bis am Ende gekammt sind."

If we accept these characters as diagnostic of the two genera, our species separate as follows:

Genus MEGALOPYGE: contains *nuda* (type), *lanata* and *opercularis*.

Genus LAGOA: contains *crispata* (type) and *pyxidifera*.

The larval characters confirm us in dividing our species into two genera, since the larva of *opercularis* has the hair crested and curled and is furnished with a terminal tail-like tuft, while those of *crispata* and *pyxidifera* are evenly and smoothly haired.

Grote states that *Lagoa* is preoccupied, but I do not find this to be the case in Scudder's Nomenclator. *Pimela*, Clem. is preoccupied by *Pimelia*, Fab. (Coleop.)

The genera of the Megalopygidae at present are as follows :

Aidos Hübn., Carama Walk., Mesocia Hubn., Podalia Walk., Ochrosoma H.-S., Sciathos Walk., Alimera Moschl., Megalopyge Hübn., Lagoa Harr., Sombrachys Kirb. (?) and Psycharium H.-S. (?)

The larva of Eupoeya.

The larva of *E. Slossonia* is flattened, green, with four dorsal red dots and fringed with a row of regular hairy appendages. They represent the subdorsal row, are detachable and furnished with heart-shaped basal pieces. There are no stinging spines. The form represents the same special adaptation as in *Sisyrosea*, but superimposed upon the phylogenetic characters of *Phobetron*. Our larva is a green *Phobetron* with all the appendages of the same length and the lateral tubercles atrophied.

Dr. Packard states that *Eupoeya* is not the Cuban *Phryne immaculata*, Grote, but he has neglected to compare the forms listed as *Euproctis argentiflua*, Hubn., *E. fumosa*, Grt., and *E. pygmaea*, Grt., all from Cuba and one of which at least is a Eucleid as shown by Dewitz. (N. act. k. Leop.-Car. Deut. akad. nat., XLIV., 252).

It is curious that the Florida and Cuba forms of *Eupoeya* should be different species, while the recent description of a third form from Jamaica, by Schaus (Journ. N. Y. Ent. Soc. IV., 57), emphasizes this fact and renders it probable that still others will be found on other islands, possibly all mangrove feeders in the larval state.

FURTHER NOTES ON AUGOCHLORA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

A portion of my table of Mexican species, on p. 4, should be amended to read as follows :—

5. Hind margins of abdominal segments broadly black, blue-green or more or less purplish-tinted species.
 - (i.) Legs black ; only the coxæ, and front femora behind, metallic *Townsendi*, n. sp.
 - (ii.) Legs metallic, blue or green ; nervures fuscous.
 - a. Smaller, largely purplish, species *labrosa*, Say.
 - b. Larger, green species, 5th abdominal segment basally purple *Binghami*, Ckll.

Hind margins of abdominal segments narrowly or not black, yellowish-green species.....6.

Augochlora Robertsoni, n. sp.

This species had apparently been confounded with *pura*, but Mr. Robertson, who takes it commonly in Illinois, has pointed out good distinctive characters in Tr. Am. Ent. Soc., XX. (1893), p. 146, under the name of *labrosa*, Say. I possess a ♀ specimen from S. Illinois, sent by Mr. Robertson, and accepting his identification of it, had placed *labrosa* in my table of Mexican *Augochlora*, from the characters it presented. Say described his *labrosa* from Mexico, however, and suspecting later an error in identification, I compared Say's description. The result is, that I am convinced that Say did not have Mr. Robertson's Illinois insect before him, and that the latter stands in need of a name, being apparently different from other described North American species. It is accordingly named after the writer who first pointed out its characters, which are, principally, the evenly punctured, not roughened, mesothorax, the broad face and deep emargination of the eyes, in the female; and the fourth ventral segment not broadly emarginate in the male. The stigma and nervures are brown, not very dark, the second submarginal cell is conspicuously longer (squarer) than in *pura*; the legs are very dark brown, the front femora metallic behind. In most respects, the insect is like *pura*, and could easily be confused with it.

Say's type of *labrosa* is said to be a ♀, while the allied *Binghami* is described from a ♂, but I do not think they can be the sexes of one species.

Augochlora Townsendi, n. sp.—♂. Length, 10 mm.; head and thorax densely and confluent punctured, brilliant blue-green, pleura becoming very strongly tinted with blue; but the face, especially the clypeus and supraclypeal area, yellowish-green, the latter with a coppery tint. Abdomen dark blue-green, not so blue as the thorax; hind margin of first segment narrowly, and of the others broadly, black; venter black, none of the segments emarginate, nor any trace of the fish-tail brush of *Binghami*. Face broad, emargination of eyes deep; clypeus shining, subcancellate with large punctures, its anterior edge very narrowly at sides, and the labrum, black; labrum striate, mandibles dark, only very faintly rufescent about the middle; antennæ reaching to scutellum, black, feebly rufescent beneath, not at all hooked at tip, first two joints of flagellum

broader than long, the first a little the shorter; third about as broad as long. Prothorax with a very strong keel running to tubercles; mesothorax evenly and very closely punctured; scutellum very finely and closely punctured at the sides, the disc with a pair of small smooth sublateral areas, a yellower green than the surrounding parts; post-scutellum very minutely punctured in the middle, coarsely subreticulate at sides, metathoracic enclosure distinct, shining, very blue, with numerous longitudinal ridges; sides of metathorax and the ill-defined truncation very closely punctured. Pubescence of head and thorax scant and pale, rather conspicuous on upper part of face, the hairs beautifully plumose. Tegulae piceous, the outer edge hyaline, the base greenish and with minute punctures. Wings dusky hyaline, stigma dark brown, nervures piceous, second submarginal cell much higher than long. Legs black, with thin white pubescence, coxae in front, and anterior femora behind, metallic blue-green; anterior tibiae in front, and anterior tarsi, rufescent, remaining tarsi more or less rufescent within; hind spur of hind tibia minutely ciliate. Abdomen with first segment having rather large, tolerably close punctures, and a small purple spot on each side; second segment with the punctures conspicuously smaller and closer; third with them still smaller, and much feebler; remaining segments with them minute and feeble. No hair-bands, but short pubescence, shining brilliant silvery in certain lights.

Hab.—San Rafael, Vera Cruze State, last of June; collected by Prof. C. H. T. Townsend on plant No. 31, which Dr. Rose says is a *Cordia*, probably *C. ferruginea*. The coloration of this beautiful insect is singularly like that of some new species of *Volucella* taken by Prof. Townsend at the same locality, especially in the effect of the pubescence and metallic colours on the abdomen. It resembles somewhat *A. urania*, Sm., and *A. feronia*, Sm., from Brazil. On the same flowers, at the same time and place as *A. Townsendi*, Prof. Townsend took both sexes of a lovely *Temnosoma*, either *T. smaragdinum* or possibly a new species, since it seems to differ from Smith's description, being larger, the head hardly quadrangular, the wings darker, etc., but it differs so little that it will be advisable to call it *smaragdinum*, Sm., var., until comparison of specimens can be made.

Plant No. 4 (see p. 6) on which *A. Binghami* was taken, has been identified by Miss Vail as *Calopogonium caeruleum* (Benth.) Britt.

A NEW PYRALID.

BY MARY E. MURFELDT, KIRKWOOD, MO.

Titanio helianthiales, n. sp.

Alar expanse 15 to 16 mm.

Head small, with long, rather bristly scales, of which it is easily denuded, the colours mingled dingy white and buff; labial palpi projecting, elongate triangular, densely scaled, of a buff colour, indistinctly margined with white; maxillary palpi not in evidence; tongue slender, naked, eyes globular, large, purplish brown; antennæ silvery white above, pale brown beneath, the joints distinct and clothed with very short pubescence. Thorax buff with white median line, patagia buff, bordered more or less distinctly with white. Abdomen clothed with buff or fulvous scales, with indistinct bands of white at base. Legs shading from pale brown femora to yellowish-white tarsi. Wings broad. Fore wings, ground colour of black, buff and white scales intermingled, ranging from dark to light in proportion to the number of white scales, which is variable; a narrow, rather indefinite, white streak extends longitudinally from the base of the wing near the inner margin to about the middle; a more distinct white area has its base on the costa in the apical third extending obliquely backward about half across the wing; a narrow white line curves around the outer margin, diverging quite widely from the latter near the apical and the outer angles, most distinct near the costa, where it very nearly touches the base of the costal fascia, to this succeeds a dark band and a second narrower white line followed by a fine black marginal line; fringes white, variegated with two dusky bands. Hind wings yellowish-white at base, shading to dusky toward the outer margin, near which is an obscure whitish band; fringes similarly marked to those on fore wings. Under side of fore wings rather dark, silvery gray, except along the inner margin, where it is almost white; near the apical angle is a light spot, larger and of oblong form in the ♂, small and round in the ♀. Described from two ♂s and two ♀s. The combination of colours gives to the eye the general impression of pale purplish-gray, or "lavender"—to employ a milliner's term—and there is considerable variation in pattern and proportion of the silvery white scales, which makes an exact description difficult.

The adolescent stages of this insect are peculiarly interesting. It is a true leaf-miner and, so far as I have been able to learn, the only member of its family as yet discovered to have that habit. It works between

the cuticles of the leaves of the Russian sunflower and probably of other species of *Helianthus*.

The mine is large, translucent, of irregular shape, but covering an area of from two to two and one half square inches. The black, granular frass drops to the lower margin. The mine and included larva bear considerable resemblance, on a magnified scale, to those of some *Lithocolletis*. Full-grown larva, 15 to 16 mm. long, 3.5 to 4 mm. in diameter across middle segments, from which it tapers gradually toward either end. Form cylindrical, with rounded segments and deep incisions, giving it a sub-moniliform appearance. General colour whitish green, often with a rosy suffusion. Head small, broadly triangular, polished, faintly mottled, dark brown on the lobes, with dingy white, triangular face. The corneous, whitish-green collar has two large, glossy, brown spots covering the greater part of its surface; or, it might perhaps be better described as brown, with broad, pale anterior and lateral margins and medio-dorsal line. Each of the other segments has the usual arrangement of conspicuous, round, dark brown, piliferous spots, from which proceed very fine, short hairs.

The pupation is irregular. In some cases the mature larvæ desert their mines and inclose themselves in oval cocoonets on the surface of the ground, but as a rule they spin up within the mine, in a nidus of loosely-webbed frass, with an inner, more firmly woven cocoon immediately inclosing the pupæ. The latter are short, and thick, of a golden-yellow colour, without marked characteristics.

The imago appears in eight or ten days after the larva spins up.

The mines were discovered August 2nd, 1896, and in all probability were those of a second brood. Another series of mines was found on the sunflower leaves September 5th to 10th, the moths from which issued shortly and probably hibernated — no later mines appearing. I am indebted to my friend, Prof. Fernald, for the generic determination of this interesting species.

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SYNONYMICAL AND DESCRIPTIVE NOTES ON NORTH AMERICAN ORTHOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In a review of *N. A. Decticinae* (CAN. ENL., XXVI.), I referred (p. 180) an undescribed Pacific Coast species provisionally to *Drymadusa*, an Old World genus of which I had not then seen specimens. Direct comparison shows that it differs from that genus in the lack of a humeral sinus on the posterior border of the lateral lobes of the pronotum and in the great posterior extension of the pronotum. I propose for it the generic name *Apote* (α -, $\pi\omicron\tau\eta$). The species, which may be called *A. notabilis*, is testaceous, tinged on the pronotum with olive-green, the abdomen fusco-testaceous, much and minutely marked with black and light testaceous, the tegmina abbreviate but attingent, testaceous with black veins. The length of the body is 37 mm.; of the ovipositor, 28 mm. Oregon.

We have, however, another genus of *Decticinae* not given in my table, consisting of long-winged species still more nearly allied to *Drymadusa*, but separable from it by the slender form, much narrower head and fastigium, narrower tegmina and the less incrassate base of the hind femora, and by the presence of spines on both sides of the under surface of the fore femora, though these are inconspicuous on the outer side of one species. It may be called *Capnobotes* ($\kappa\alpha\pi\nu\omicron\beta\acute{o}\tau\eta\varsigma$) in allusion to the smoky aspect of the insects.

To this belong two species described by Thomas and referred to *Locusta*, and which I had not determined when I published my former paper. Prof. L. Bruner has kindly sent them to me, as well as two other species, one of them from Lower California. The three United States species may be separated by the following table:—

- a.*¹ Outer margin of fore femora distinctly spined beneath; metazona considerably elevated above the prozona, so that the pronotum is subselfiform.

- b.*¹ Metazona abruptly elevated above the prozona ; anterior sulcus of pronotum very deeply impressed ; ovipositor much shorter than hind femora ; tegmina marked with pallid spots and streaks *fuliginosus*, Thom.
- b.*² Metazona gradually elevated above the prozona ; anterior sulcus of pronotum distinct but not deep ; ovipositor longer than the hind femora ; tegmina nearly uniform in coloration... *Bruneri*, sp. nov.
- a.*² Outer margin of fore femora very faintly spined beneath ; metazona scarcely elevated above the prozona, and the pronotum not subsellate... *occidentalis*, Thom.

Fuliginosus was described by Thomas from a male from Arizona, and the specimen, a female, sent me by Bruner is from the same territory ; *Bruneri* comes from California and was sent me by Professor Bruner ; *occidentalis* was originally described from California, and the specimens I have seen come from Nevada and Utah. The sub-family Locustinæ to which Thomas thought these species belonged has not been recognized in the New World.

On different occasions I have received from the extreme southwestern part of the United States specimens of a large speckled Acridian belonging to a generic type of *Eremobiini* very distinct from any known and differing widely from either of the two known genera of this group found in our territory. It may be called *Tytthotyle* (τυτθός, τύλη). It has a general *Oedipodid* aspect, not unlike *Anconia* or *Hadrotettix*. The body is not depressed, and but little compressed ; the head is normal, with rather large and prominent eyes ; the intraocular space, as seen from above, is narrower than the width of the eyes ; the vertex is carinulate ; the fastigium of the vertex sulcate, distinctly declivent, passing by a scarcely interrupted curve into the frontal costa ; the latter is not very broad, contracted and sulcate just below the ocellus, then disappearing. The antennæ are slender and shorter than the pronotum, at least in the female. The pronotum narrows rapidly from behind forward, is feebly carinulate with blunt lateral rugæ or shoulders, the lateral lobes of equal width throughout ; the metazona is a little longer than the prozona, subacutangulate posteriorly ; the prozona is twice cut by transverse sulci, and is a little tumid on the disk. The tegmina and wings are fully developed and much longer than the body. The hind femora are scarcely compressed, of general *Oedipodid* form, merely carinate above ; the inner and outer calcaria of the hind tibiæ are subequal, and the areolea minute.

I know of but one somewhat variable species, described by Bruner as *Thrincus* (?) *maculatus*. Mr. Bruner has kindly sent me types of this for examination.

The tribe Thrincini has not been found in America. The second species which Bruner has referred doubtfully to *Thrincus*, viz., *T. aridus*, belongs to *Heliastus*, a genus of Oedipodini in near vicinity to the Thrincini. The species described by Thomas under the name *Thrincus californicus* also belongs to *Heliastus*.

Among the Oedipodini, *Mestobregma* Scudder and *Trachyrhachis* Scudder are synonymous and the former has priority.

In *Psyche* (vi. 265) I pointed out that my *Leprus ingens* from California belonged to a new generic type, for which I now propose the name *Agymnastus* (ἀγύμναστος) in allusion to its clumsy inactivity. It is most nearly allied to *Leprus* Sauss., but differs from it in its more bulky shape, due largely to the exceptional breadth of the mesosternum, its abbreviated organs of flight, which do not wholly conceal the abdomen when at rest, and the presence of a subcostal taenia reaching the base of the wings from the transverse fascia common to both genera; the posterior process of the pronotum also in rectangulate instead of rounded subacutangulate, and the intercalary vein of the tegmina is more or less obscure proximally and only a little nearer the median than the ulnar vein; the upper and lower carinæ of the hind femora, and especially the lower, are subfoliaceous.

One of the genera of our Tryxalinæ has been very much named. It was first described by me under the name *Aulocara*, males only of which were seen. Very shortly afterward I redescribed it, from the female only, as *Oedocara*. A few years ago Brunner renamed it *Coloradella*, and recently McNeill has given it the name *Eremnus*; *Aulocara* of course has priority, and the species on which it was founded proves, as Bruner has already pointed out, to be identical with Thomas's *Stauronotus Elliotti*. The genus under the name *Oedocara* was included by Saussure in the Oedipodiniæ and by Brunner (as *Coloradella*) in the Tryxalinæ, an excellent illustration of the difficult definition of these two sub-families.

Some years ago, in *Psyche*, V., I attempted to show that certain genera that had been referred to Tryxalinæ should really be placed in the Oedipodiniæ. I now think I was mistaken, at least as regards all the genera found in our own country, and would follow Brunner in placing them in the Tryxalinæ. It was partly owing to my statements that Mr McNeill has rejected them from his recent Revision of the Tryxalinæ.

The generic name *Beta*, proposed by Brunner in 1893 for two unnamed species in his collection from Texas and Colorado, is proved by a specimen sent me by him to be the same as my *Phlibostroma* (1875). His *Pseudostauronotus*, proposed at the same time and manner, is identical, as a specimen sent me shows, with my *Stirapleura*.

A REMARKABLE APPEARANCE OF CATOCALA INSOLABILIS.

On Friday, June 6th, 1896, the first *Catocalas* were noticed in this locality for the season. Three *Insolabilis* were taken. The weather was hot—87° in the shade at 1 o'clock. The Saturday following was also hot, and *Catocalas* were abundant. During the forenoon twelve were taken on trees near the house. In the afternoon twenty-one more were taken on trees at some distance from the house, and in the evening, at sugar, twenty-three more were captured. Of the entire number (56) fifty were *Insolabilis*, one *Nurus*, three *Ilia*, one *Uxor*, and one *Marmorata*. Sunday the weather was still hot, and on the way to and from church *Catocalas* could be seen on nearly every tree. The wind continued south-west. On Monday the wind had changed to south-east, and the *Catocalas* were still present, but resting higher up on the trees. This being a work day, I had but little time for observation or collection. After school hours, however, a few minutes were spent in the woods, and the *Catocalas* were found hard to capture. When startled they would light high up in the trees, sometimes fully twenty feet from the ground, and some would even alight upon the leaves of the trees. At dusk *Insolabilis* came to the sugar in abundance, and thirty were taken before it was dark enough to need a lantern. In all, fifty-seven were taken on Monday, all but five being *Insolabilis*. On Tuesday the wind was north-west, and not a *Catocala* was to be seen. Not one came to sugar that evening. The only *Catocala* that was seen on Tuesday was snapped out of a tree by a scarlet Tanager and immediately torn to pieces.

I have talked with other collectors of this vicinity, and all seem to have secured a goodly share of *Insolabilis*.

In the parks and suburbs of Chicago there were literally thousands of *Insolabilis* during the three days. Previous to this remarkable flight the species was not common, so far as I have been able to ascertain.

ARTHUR J. SNYDER, North Evanston, Ill.

DESCRIPTION OF THE STRUCTURAL CHARACTERS OF THE LARVA OF SIBINE FUSCA, WITH NOTES ON THE FOUR KNOWN LARVÆ OF SIBINE.

BY HARRISON G. DYAR, NEW YORK.

Stoll figures the moth of two species of Sibine. He also figures two larvæ of Sibine, but, owing to the unfortunate confusion into which his labels must have fallen, they are not attributed to the right imagines, but to two species of Diptidæ. After Stoll, Sepp also illustrated two species of Sibine, with their larvæ correctly shown. One of Sepp's species is the same as one of Stoll's, the other is different in both larva and moth. This gives three species of the genus known in both larval and mature states, assuming only that the larva which Stoll figures as *micilia* (228 G.) really belongs to the moth *nesea**, which I think is probably the case.

The names of the species are *nesea*, Stoll; *fusca*, Stoll (= *trimacula*, Sepp = *bonaerensis*, Berg. = ? *megasomoides*, Walker = ? *affinis*, Moeschler), and *vidua*, Sepp (= ? *fumosa*, Walk.). As a fourth species we have *stimulea*, Clemens (= *ephippiatus*, Harr.).

The larvæ have in common the following characters: (1) The shape of the body, which may be sufficiently described by a reference to the well-known *S. stimulea*; (2) the absence of subdorsal horns which bear stinging spines on joints 6 to 10; (3) the presence of a large patch of detachable spines above the horn on joint 13 and the lateral horn of joint 12; (4) probably the presence of skin spinules only without granules, though this can not be definitely asserted till the two species *nesea* and *vidua* have been microscopically examined; (5) the coloration involves a square green patch on the middle of the back, variously modified. Other characters are shared by the whole group of spined Eucleids.

SYNOPSIS OF THE LARVÆ.

The subdorsal horns which are present, long.

Lateral horns long; green, the horns all purple-brown, dorsal mark square, dark green, broadly edged with yellow.....*vidua*.

Lateral horns short.

Subdorsal horns and body green; dorsal mark square, without a central dark patch, edged before and behind with yellow....*nesea*.

Subdorsal horns and body purple-brown; dorsal mark elongate, projected below the posterior subdorsal horns, and bearing a central, elliptical purple-brown patch edged with white...*stimulea*.

* Stoll's so-called larva of *nesea* is an absurd error. It is a Notodontian with a long yellow horn on joint 6.

The subdorsal horns short; green, the dorsal mark much elongated, reaching the posterior end of the body and projected forward below the anterior subdorsal horns, edged with yellow. *fusca*.

The larva of *fusca* is evidently the most highly specialized. I have received a number of alcoholic specimens from Mr. G. Ruscheweyh, of Buenos Ayres, Argentina, under the name "*Streblota bonaerensis*," but I am unable to find any differences in either moth or larva from Sepp's figures. The coloration is largely lost in my material through the effect of the alcohol, but the outline separating the two shades of green can easily be traced, and is exactly as shown by Sepp and Stoll.

Larva.—As compared with *S. stimulea*, Clem., the body is of the same shape, or a little more flattened, but all the horns are short. Subdorsal horns present on joints 3 to 5, 11 to 13, about .5 mm. long, alike, bristly with stinging spines; absent on joints 6 to 10. Lateral horns on joints 3, 4, 6 to 12, even shorter than the subdorsals, sessile spined. A subventral row of two distinct pale setæ.

Dorsum broad, flattened, sides oblique, subventral space small, contracted. Segmental incisures deep, the depressed spaces (1) dorsal intersegmental paired, two lateral (4) and (6) all show as distinct black dots buried in the intersegmental folds; addorsal spots (2) also present, small. A large, elongate patch of detachable spines above the lateral horn on joint 12, and a smaller one above the horn of joint 13. Caltrop patches present on the bare tips of the lateral horns of joints 6 to 12 apparently, but nearly all the caltrops are lost in my specimens. The caltrops and spines correspond with those of *S. stimulea* (Journal N. Y. Ent. Soc., Vol. IV., plate 1, figs. 5 and 6). Skin not very finely spinulose, the bases of the spinules enlarged, approximating granules, but still bearing the sharp tips. Colour largely green, a line of dark spinules joining the subdorsal horns of joint 5 runs forward on each side below the subdorsal horn on joint 4, turns down behind the lateral horn of joint 3, and runs backward just above the row of lateral horns to joint 12, turns up over the subdorsal horn of 12, and joins its fellow again just above the horn on joint 13; a detached ring also surrounds the subdorsal horn of joint 11. This line evidently marks the joining of the dorsal green with a different tint, which obtains over the horns, the stigmatal region and the dorsum of joints 3 to 5. Thoracic feet and venter as usual; the spiracle on joint 5 moved up above the others.

Habitat.—If my synonymy is correct, *Sibine fusca* ranges throughout the eastern part of South America, from Guayana to Argentina,

DESCRIPTION OF THE LARVA AND PUPA OF
AULAX NABALI.

BY THOMAS W. FYLES, SOUTH QUEBEC.

The tall White Lettuce, *Nabalus altissimus*, Hooker, is a striking and graceful plant. At Quebec it is found in glades and on the edges of woodland roads. Its wand-like stems rise sometimes to the height of six feet, and end in panicles of greenish-white or pale straw-coloured flowers. The stems are hollow, but have a lining or inner coat of white downy pith, which in the summer is sometimes found to be broken with discoloured warts. Late in the fall, when the stems of the plant have become indurated and the pith has dried up, the warts are found to have developed into galls of the size, shape and colour of grains of hemp. I have found them in the stems from about six inches above the ground up to a height of three feet or perhaps more. Sometimes they appear in clusters, sometimes in rows, and sometimes singly at intervals. The proper inhabitant of each of these galls is a footless, spindle-shaped grub, one-eighth of an inch long. In colour it is like white wax, with the mouth organs brown. It is more pointed at the head than at the other extremity. It lies curled round in the gall.

Towards spring the pupal change takes place. This change may be hastened by warmth; the specimens I have kept in my study are now (January 9th) passing through it. A week or two after the change the pupa is of compact form, white, waxen, with amber-coloured eyes. The head is small, the thorax large and convex, and the abdomen ovate and closely joined to the preceding part. The legs are drawn up by the sides of the thorax, and the tarsi are stretched backwards under the body. The antennæ (beautifully translucent) are turned under the head and extended between the tarsi, reaching nearly to the end of the abdomen.

The perfect insects were described by Dr. Brodie, of Toronto, in the 25th volume of the CANADIAN ENTOMOLOGIST, p. 12. I copy his description for the benefit of those who may not have the volume at hand:

“♀.—Length, 2.50 xx. Antennæ 13-jointed; uniform brown; head “and thorax black; abdomen shining brown, with a large anterior dorsal “spot black; all the tibiæ, femora and tarsi brown, a little paler than the “abdomen; wings ample, veins well-defined, hyaline, iridescent at certain “angles.”

“Abdomen of ♂ darker brown, and without the dark dorsal spot.
“From numerous specimens.”

Dr. Brodie discovered the galls in great abundance at the roots of the White Lettuce. I have not yet found them at the roots of the plant, and I am inclined to think that the insects are less numerous at Quebec than Toronto.

A NEW SPECIES OF ANCYLOXYPHA.

BY G. H. FRENCH, CARBONDALE, ILL.

Ancyloxypha Longleyi, n. sp.

Female.—Expanse 1 inch. Fore wings with the costa more straight from the shoulder to near the apex than in *Numitor*, in this respect approaching *Thymelicus*; apex rounded, but less than in *Numitor*; outer margin and hind wing rounded, much as in *Numitor*; antennæ reaching but little more than one-third the distance to apex of fore wings; palpi as in *Numitor*, but the third joint longer; abdomen surpassing hind wings, but less so than in *Numitor*; the whole insect more robust than *Numitor*.

Fore wings brown, darker than in *Numitor*, without the discal yellow patch, emitting a pale blue sheen in reflected light; a few yellow scales below the costa between the venules, and a few scattered on the base of the wing, but in either case not enough to give a yellow colour; otherwise the wing is uniform brown. Hind wings marked and coloured as in *Numitor*; yellow, with outer and costal borders and base brown, the brown along internal margin running to a point before reaching anal angle.

Under side differing very little from the under side of *Numitor*; the dark central and posterior area of fore wings a little darker brown, the costal and outer margins yellow, the yellow running to a point before reaching the posterior angle. Hind wings uniform yellow.

Antennæ black, annulate with white; club black, tipped with brown—the club of *Numitor* is tipped with black; palpi white at sides, black above, terminal joint black; thorax concolorous with fore wings, abdomen concolorous with hind wings.

The above description is drawn from a single specimen taken at Ridgeland, near Chicago, September 6th, 1896, by Mr. W. E. Longley, in whose cabinet it is and after whom I have named the species. In describing the species I have compared the specimen with *Numitor* because that species is so common all over this portion of our country. I hope the Chicago collectors will be on the lookout for this species the coming season.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.

The size and beauty of the Longhorns are in themselves sufficient to render them objects of interest to a beginner; adding to this the fact of the great abundance of certain species and the destructive work of their larvæ, we can readily understand their importance to all who are in any way interested in Entomology, whether as a pleasant recreation for leisure hours or a serious pursuit for gain. Although usually easily recognized by sight, the family is, as stated by Dr. Leconte, almost impossible to define. The tarsi are apparently four-jointed, the fourth joint being very small and connate with the fifth. The antennæ are usually very long, especially in the males, filiform or serrate, often borne on large frontal tubercles. The eyes are frequently deeply emarginate. Tibial spurs are present. The larvæ are grub-like, living in burrows or chambers which they excavate for themselves in the woody tissues or in the pith of plants, the pupa resting in a cell constructed by the larva in its gallery.

The collector will obtain many species of this family by carefully beating branches (especially if partially dead) and flowers, over a sheet or an umbrella. Dead logs should be searched, on both the upper and lower surfaces, and particularly freshly-cut timber or sawed lumber. A morning spent in a wood yard will often repay one richly in rare specimens. Some are to be found commonly under bark and may be trapped by loosely fastening pieces of bark to a tree over night and examining the under side of bark in the morning. A great number fly to lights after dusk. Dead twigs and branches may be sawed or cut off, preferably during the autumn months, and kept in large boxes or in an empty room until the beetles are disclosed through the development of the larvæ contained therein. While the activity of the Canadian collectors has already resulted in the recording of a great number of species, there can be no doubt that others will reward the efforts of explorers of the more remote districts.

Although mostly of at least moderate size, and after once identified easily recognized again, their classification presents considerable trouble owing to the fact that structural characters are so unstable and consequently of less than usual value for the separation of large groups. In the main, the arrangement adopted is that presented in the Leconte and

Horn "Classification," though the tables are constructed on a different plan and on account of the limits of the fauna it has been possible to do away altogether with the use of certain characters difficult of observation.

The prothorax in the Longhorns offers two principal types: that in which the lateral edge is sharp or thin for almost or quite the whole length, more or less toothed, giving us the form called *marginæd*, and that where it is cylindrical or rounded on the sides, which may, however, be either spined, tuberculate or plain. Thus we have a point of departure for sub-family separation, which may be aided by taking into account, among those genera in which the thorax presents the second form, a study of the palpi. These may have the terminal joint more or less compressed or subtriangular as in the Cerambycinæ, or this joint may be cylindrical and pointed at tip as in the Lamiinæ. The front tibiæ in the latter group have an oblique sulcus or groove on the inner surface, not always very distinct, but to be seen without difficulty in the larger species like *Monohammus*; once seen it may be used with some facility elsewhere. In the Cerambycinæ this groove is wanting.

Following the Classification, we may, then, throw the characters into tabular form, separating three sub-families, thus:

Prothorax marginæd, antennæ not pubescent, labrum connate with the epistoma PRIONINÆ.

Prothorax not marginæd, labrum free.

Front tibiæ not grooved; last joint of palpi not acute at tip, often subtriangular CERAMBYCINÆ.

Front tibiæ with an oblique groove on the inner side; palpi with last joint cylindrical, pointed at tip LAMINÆ.

The Canadian species of the first sub-family, the Prioninæ, are but three in number and represent as many genera. All of them are of rather large size, brown colour, and with elytra of a leathery appearance. The genera may be distinguished thus:

Sides of prothorax two- or three-toothed.

Form elongate, parallel; antennæ more slender, joints not overlapping *Orthosoma*.

Form stout; antennæ heavy, joints overlapping, especially in the male *Prionus*.

Sides of prothorax with one tooth, antennæ slender *Tragosoma*.

ORTHOSOMA, Serv.

Represented by *O. brunneum*, Forst. (Fig. 12), a large brown insect, .88 to 1.60 in. long, the elytra nearly parallel-sided, shining and rather thickly punctured. Prothorax more coarsely sculptured above than the elytra, each side with three sharp teeth. The head bears a deep, sharp impression between the eyes. The basal antennal joints are stouter in the males than in the females. I have found the larvæ in rotten pine timbers under sidewalks.

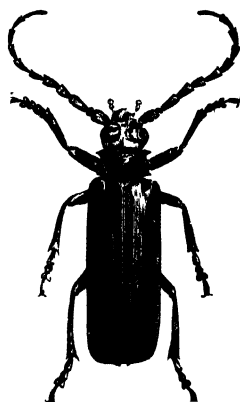


FIG. 12.

PRIONUS, Geoff.

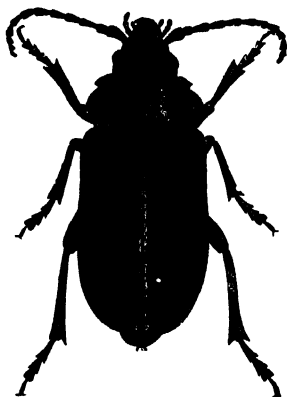


FIG. 13.

The largest Canadian Longhorn is *P. latitollis*, Drury (Fig. 13). It varies in length from .88 to 1.88 in., and is of a brownish or blackish colour, the prothorax almost or quite as broad as the base of the elytra, sides with three teeth, of which the posterior is sometimes poorly marked. The elytra are much broader at base than at apex. Antennæ twelve-jointed in both sexes, much heavier in the male. The larva (Fig. 14) is said to injure the grape, poplar, apple, and pine, by boring in the roots.

TRAGOSOMA, Serv.

T. Harrisii, Lec. (now considered by some writers as identical with the European *T. depsarium*, L.), is a curious-looking beetle of elongate form and brownish colour. The antennæ are slender, the prothorax small in comparison with the elytra, very hairy and armed on each side with a single sharp tooth, in front of which the lateral margins are convergent. The elytra are shining, distinctly punctured and with numerous longitudinal raised lines. I have taken the species under pine bark. It varies in length from 1.20 to 1.40 in.

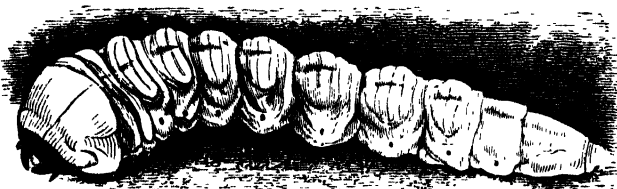


FIG. 14.

The next sub-family, the Cerambycinæ, is of great extent, and in consequence more difficulty is encountered in arranging the genera. In the use of the table considerable care must be exercised by those who are unfamiliar with the structure of the Longhorns. This is especially true of the first character involved, *i. e.*, the enveloping of the base of the antennæ by the eyes. In order to obtain a proper appreciation of this structure, the antennæ should be extended forward from the head: in this position it will be seen that in those genera where the "base of the antennæ is partially enveloped by the eyes" a line passing from the anterior or inner border of the upper lobe of the eye to a corresponding point on the lower lobe will pass through the antennal socket, whereas in the other genera this line would run behind the socket. Of course none of the genera in which the eyes are entire (*i. e.*, not emarginate) will belong to the former category, though those with emarginate eyes may belong to either. Comparisons of a few specimens ought to make this clear.* The remaining characters may be easily verified by careful examination of a few species the positions of which are already known to the student, and with these as a point of departure he should meet with no greater difficulty than is always to be expected in dealing with a group of large size, wherein colour and sculpture are inconstant and secondary sexual characters well marked. The following table is submitted for generic discrimination; a short account of the method of using may be useful to some. Suppose on taking up our insect, which we have previously ascertained to belong to this sub-family, we examine the position of the base of the antennæ with regard to the eyes, since this is the first point of departure: ascertaining the antennal bases to be partly enveloped, we find ourselves referred to the number 12 at the end of the line. We now run down along the numbers at the *beginning* of the lines until we reach 12, which shows us where to recommence our analysis, with a scrutiny of the second antennal joint. Suppose we find this joint large, we are referred to the number 36, under which (on searching out its position at the beginning of a line) we are again confronted with a query, this time as to the relative proportion of the second joint to the fourth; if these two joints are about

*Cases will, however, arise in which this point is in doubt. In such an event the choice will rest between the Callidioides and the Cerambycoides. The former have the second antennal joint larger (as a rule) than the latter, but I can find no hard and fast distinction which will serve the beginner as a sure test. A certain number of properly named specimens serving as a guide to tribal and generic facies is almost indispensable here. It should be stated that the table is based on the characters developed in the "Classification," but is intended to apply only to the Canadian fauna.

equal, our insect belongs to *Microclytus*. The generic sequence followed in succeeding pages is the same as that employed in the table and is hence slightly different from the Henshaw Check-list.

TABLE OF GENERA OF SUB-FAMILY CERAMBYCINÆ.

Base of antennæ not enveloped by the eyes	2.
Base of antennæ partially enveloped by the eyes	12.
2. Front coxæ transverse, not prominent (<i>Callidioides</i>)	3.
Front coxæ conical, prominent (<i>Lepturoides</i>)	37.
3. Eyes divided, apparently four in number	<i>Tetropium</i>
Eyes not divided, often deeply emarginate	4.
4. Brown species, second antennal joint proportionately larger, often half as long as the third and sometimes twice as long as wide. Elytral costæ usually distinct	5.
Variously coloured, often ornate species, second antennal joint proportionately smaller, often much less than half the length of the third and never much longer than wide. Elytral costæ usually indistinct	6.
5. Eyes hairy, finely granulated	<i>Asemum</i> .
Eyes not hairy, coarsely granulated	<i>Criocephalus</i> .
6. Elytra with narrow raised white lines, prothorax with very deep median groove, thighs strongly clubbed	<i>Physocnemum</i> .
Elytra without distinct raised white lines (traces are sometimes visible in <i>Merium</i>)	7.
7. Prothorax very short, strongly rounded on the sides. Upper surface entirely opaque, lustreless. Black, prothorax red	<i>Rhopalopus</i> .
Prothorax not very short, the width not apparently much exceeding the length. Upper surface at least moderately shining	8.
8. Thighs more slender; antennæ with the eleventh joint divided in the male. Colour above blackish, prothorax red	<i>Gonocallus</i> .
Thighs strongly clubbed, colour variable	9.
9. Anterior coxæ contiguous	10.
Anterior coxæ at least moderately distant	11.
10. Palpi unequal, the labial much the shorter	<i>Phymatodes</i> .
Palpi about equal	<i>Callidium</i> .
11. Dorsal surface of prothorax with narrow median and moderate or small lateral callosities	<i>Hylotrupes</i> .
Dorsal surface of prothorax with a very broad, smooth, shining median space, which bears a few large punctures. Elytra with more or less distinct raised lines of a yellowish or whitish colour	<i>Merium</i> .

12. Second joint of antennæ large (*Cerambycoides*) 36.
 Second antennal joint small 13.
13. Eyes coarsely granulated 14.
 Eyes finely granulated 21.
14. Front coxal cavities open behind 15.
 Front coxal cavities closed behind; small pale species with the first
 abdominal segment very long 20.
15. Scutellum acute, triangular, antennæ very long, prothorax with lateral
 spine *Chion*.
 Scutellum rounded behind 16.
16. Elytra with elliptical elevated ivory-like spots, in pairs *Eburia*.
 Elytra without raised ivory-like spots 17.
17. Femora not strongly clubbed, antennæ spinose 18.
 Femora strongly clubbed 19.
18. Large species; metathoracic episterna narrower behind . . . *Romaleum*.
 Moderate-sized species, episterna parallel *Elaphidion*.
19. Antennæ bisulcate externally *Tylonotus*.
 Antennæ not sulcate nor hairy *Heterachthes*.
 Antennæ not sulcate but quite hairy *Gracilia*.
20. Prothorax much narrower at base than at apex *Phyton*.
 Prothorax dilated at middle, but about equal at base and apex . . *Obrium*.
21. Elytra either very short, not covering the abdomen, or rapidly narrow-
 ing behind and broadly dehiscent along the suture 22.
 Elytra normal, not abbreviated nor notably dehiscent 23.
22. Elytra about as long as the prothorax *Molorchus*.
 Elytra about twice as long as the prothorax *Callimoxys*.
23. Scutellum rounded or (in *Cyllene*) broadly triangular 24.
 Scutellum acutely triangular 25.
24. Tibial spurs small, thighs suddenly and strongly clubbed. Form slen-
 der and cylindrical. Black, elytra and abdomen scarlet . . *Ancylocera*.
 Tibial spurs large 27.
 Prothorax opaque, sides with spine or large tubercle 26.
 Prothorax shining, sides unarmed *Batyle*.
 Elytra coarsely punctate, sutural angle produced *Purpuricen*.
 Tibiæ strongly carinated, form slender. Elytra without narrow cross-
 bands of pubescence, punctuation sparse and coarse. Antennæ
 as long (♀) or longer (♂) than the body *Stenosphenus*.

- Tibiæ not carinated, form usually stouter. Elytra in most cases with lighter coloured angulated cross-bands; antennæ usually shorter than the body in both sexes. Punctuation fine. 28.
28. Head comparatively small, front short, oblique; legs hardly clubbed. Intercoxal process of first ventral rounded 29.
- Head large, front long, intercoxal process acute. 32.
29. Prothorax transversely excavated at sides near the base, prosternum perpendicular at tip. *Cyllene*.
- Prothorax not excavated at sides, which are rounded and constricted at base. Prosternum declivous at tip. 30.
30. Antennæ filiform. 31.
- Antennæ subserrate, compressed. Size large, colours strikingly contrasted with black and yellow bands. *Plagionotus*.
31. Large species, prothorax entirely black, much rounded on the sides. *Calloides*.
- Smaller, less robust; prothorax with central black spot, the remainder clothed with gray pubescence, sides much less rounded. *Arhopalus*.
32. Elytra plane; moderate sized species 33.
- Elytra gibbous at base; small ant-like species 35.
33. Head with a carina of variable form *Xylotrechus*.
- Head not carinated. 34.
34. Prothorax with transverse dorsal rugæ or ridges. *Plagithmysus*.
- Prothorax without transverse ridges. *Clytanthus*.
35. Elytra with a transversely oblique ivory-like band. *Eudermes*.
- Elytra without ivory band. *Cyrtophorus*.
36. Second joint of antennæ equal to the fourth. *Microclytus*.
- Second joint of antennæ less than half as long as the fourth. *Atimia*.
37. Elytra short, not covering the wings. *Necydalis*.
- Elytra normal 38.
38. Joints 3 to 5 of antennæ much thickened at their tips, inner angle sometimes much produced. Large insects, bright blue with an orange band across base of wing-covers *Desmocerus*.
- Joints 3 to 5 of antennæ normal, usually slender and never produced inwardly at tips. Elytra usually tapering to apex, sometimes more or less dehiscent. 39.
39. Spurs of hind tibiæ terminal. 40.
- Spurs of hind tibiæ not terminal, but borne at the base of a deep excavation. Thorax tuberculate or spinose at sides. *Toxotus*.

40. First joint of hind tarsi with the usual brush of hair beneath (except in certain *Acmaeops*). Prothorax, with rare exceptions, distinctly tuberculate at sides or with heavy lateral spine. Head obliquely narrowed behind eyes. 41.
- First joint of hind tarsi without brush-like sole. Prothorax, with few exceptions, broadest at base, sides never spined and rarely tuberculate. Head suddenly constricted behind the eyes. 46.
41. Antennæ short, joints 5 to 11 wider. Prothorax with a heavy spine at sides, elytra strongly costate *Rhagium*.
- Antennæ long or moderate, not thickened, elytra never strongly costate. 42.
42. Eyes large or moderate. Thorax (except in *Pachyta monticola*) with sharp, strong, lateral spine. 43.
- Eyes small, not emarginate, prothorax angulate or rounded on sides. 45.
43. Eyes coarsely granulated, very prominent; form of body parallel. *Centrodera*.
- Eyes finely granulated; body narrowed behind. 44.
44. Eyes feebly emarginate. *Pachyta*.
- Eyes more strongly emarginate. *Anthophilax*.
45. Mesosternum not protuberant, body above more or less pubescent, sometimes moderately shining. *Acmaeops*.
- Mesosternum protuberant, body above brilliant metallic green. *Gaurotes*.
46. Head constricted far behind the eyes, neck consequently very short. Form extremely slender, hardly tapering behind, prothorax with lateral tubercle. *Encyclops*.
- Head constricted close behind the eyes. Form variable, usually much narrowed behind, prothorax rarely bulging at sides and never with distinct tubercle. 47.
47. Last ventral of male deeply excavated. 48.
- Last ventral of male not excavated. 49.
48. Antennæ without poriferous spaces, size large, sides of elytra deeply sinuate. *Bellamira*.
- Antennæ with impressed poriferous spaces on sixth and following joints. Size moderate, sides of elytra sinuate, form very slender. *Strangalia*.
49. Antennæ with poriferous spaces. *Typocerus*.
- Antennæ without poriferous spaces. *Leptura*.

THE LOST LEDRA AGAIN.

BY HERBERT OSBORN, AMES, IOWA

The interesting note by Prof. Baker on *Ledra perdit*a (*Centruchus perdit*a, A. & S.) deserves notice on account of the mystery which it clears up, and it may also be worth while to add some testimony in the way of corroborative evidence.

A few weeks ago (Dec., '96) I had occasion to review the matter in an attempt to locate the *perdit*a, and, in a critical examination of Amyot and Serville's figure and description, was struck by the resemblance to our common *Microcentrus caryæ*. On careful comparison, however, with this species and with the *Centruchus Liebeckii* of Goding, I concluded the figure and description must apply to the latter. It seemed so strange that a connection so obvious, when once seen, should have so long escaped the attention of Homopterists that I made a further search in the available literature, with the result of finding in a note by Dr. Goding, on "Fitch's Types of N. A. Membracidae" (CANAD. ENT., Vol. XXV., p. 172), the statement that "No. 2152, labelled *Ledra perdit*a and *capra*, Mels., is *Centruchus Liebeckii*, Godg." There is no comment to indicate that Dr. Fitch corrected the family reference from *Ledridæ* to *Membracidae*, but considering his familiarity with the Homoptera in general, and the *Membracidae* in particular, it is probable that he appreciated the full significance of his specific determination, and it is quite likely that his unpublished notes would show comments on this reference.

In any case, we have the testimony of Dr. Fitch in identifying his specimen as *Ledra perdit*a and its recognition by Dr. Goding as *Centruchus* to confirm Prof. Baker's conclusion.

OCCURRENCE OF SCHISTOCERCA AMERICANA (DRURY)
AT TORONTO.

Mr. C. T. Hills recently brought me a specimen of the large, handsome locust, *Schistocerca Americana*, Drury, which was taken about the 12th of October, 1896 (the exact date was not recorded), by Mr. H. Parish, while collecting at High Park. Mr. Parish found the insect resting on the trunk of a tree. The specimen is a female, in perfect condition, measuring 4.75 inches in expanse of wing, and is in every respect similar to examples of this species which I have from Tennessee. This is only the second time it has been taken in Canada; Mr. J. A. Moffat having recorded it from London (CAN. ENT., XXVII., p. 52.).

E. M. WALKER, Toronto.

NEW COCCIDÆ FOUND ASSOCIATED WITH ANTS.

BY GEORGE B. KING AND T. D. A. COCKERELL.

[The species described below were all collected by Mr. King. The notes on the microscopical characters were prepared by Mr. King, but have been extended and rewritten from Mr. King's mounts by Mr. Cockerell, who is also responsible for the comparisons with allied species. The notes on the living insects, habitat, etc., are all by Mr. King.]

Lecanopsis lineolata, n. sp.

♀ (cleared and mounted).—Oval, length somewhat over 2 mm., dermis practically colourless, legs and mouth-parts tinged with sepia, anal plates a warm yellowish-brown, quite a different colour from the legs. The mouth-parts inclined rather to a madder-brown. Legs and antennæ small, hind legs not nearly reaching the anal plates, tip of femur of middle legs reaching extreme base of hind legs. Posterior cleft wide. Antennæ fairly stout, gradually decreasing in size distad, 8-jointed: 3 longest, not quite twice as long as broad; 2 and 4 next, and about equal; 5 and 1 of about equal length, but 1 much broader than long, 5 longer than broad; then the last three subequal, but 8 the longer. Formula 3 (24) (15) 8 (76): 8 with several small hairs. Anterior tibia and tarsus as long as antennal joints 2 to 6, the tarsus about half as long as tibia; femur very stout, not as long as tibia on its inner side, but a little longer on its outer; trochanter and coxa both very large. The legs are altogether noticeable for their stoutness, but the basal parts are especially enlarged. Claw large, moderately curved, digitules of claw stout, extending beyond its tip; tarsal digitules filiform, all but two broken off in the specimen. The claw-digitules are enlarged at ends to an obliquely truncate club, but the tarsal digitules with only an excessively minute club. There is the usual long bristle at the tip of the trochanter, and a short erect hair a little way up the femur on the inner side. Anal plates rather broad, the caudolateral side a little longer than the cephalolateral; a large bristle near the tip and another at the extreme base; these bristles are very large, and may possibly be dermal, beneath the plates; especially as there is a corresponding pair on the skin laterad of the plates, that opposite the hindmost bristle being considerably shorter than it. Hairs of anal ring broken, but apparently they were stout and not numerous. Skin without any distinct markings; marginal spines fairly large, pointed, simple, easily deciduous, a very little further apart than the length of one. Stigmatal spines in threes, one long, two much shorter but not very short.

Hab.—With *Cremastogaster lineolata*, two specimens in a nest at Lawrence, Mass., July 15th, 1894.

This is not a strictly typical *Lecanopsis*, but belongs apparently in the subgenus or genus *Spermococcus* of Giard. By its 8-jointed antennæ it resembles *L. formicarum*, Newstead, but it differs at once from that by the smaller (though still large) first antennal joint, the longer second joint, the much longer third joint, the femur decidedly stouter, the tibia not beset with numerous bristles, and the claw-digitules stout. *Lecanopsis* is simply a segregate from *Lecanium*, modified for underground existence. Maskell's *Lecanopsis filicum* hardly belongs here; in some respects, but not in others, it seems to approach *Myxolecanium*; it also recalls in some of its characters such forms as *Lecanium Urichi*.

Phenacoccus americana, n. sp.

♀.—When alive fusco-testaceous, smooth, soft, sticky, and free from any wax or down; when put into alcohol its colour changes to a rufous-violaceous, and it becomes quite wrinkled, its general form is rounded, with a slice of nearly one-fourth cut off, making its under surface flat. Length (in alcohol) $3\frac{1}{2}$ mm., width 3 mm.

♀ (cleared and mounted).—Oval, brown of a rather warm sepia tint, antennæ and legs very pale yellowish. The legs are slender, and although the insect is much larger, its legs are not so large as those of some of the ant's-nest species of *Rhipersia*; but at the same time they are well-formed and ordinary, not shortened or swollen as in the *Lecanopsis*. Trochanter with one long and at least two short bristles. Femur little longer than tibia, its inner margin straight, with four or five erect bristles; its outer margin very gently arched or bent, with a conspicuous erect bristle at the bend. Tibia slender, with eleven conspicuous bristles, tending to form three whorls. Tarsus rather over two-thirds length of tibia, with similar but finer bristles, no nobbed tarsal digitules. Claw large, little curved, with a minute denticle on inner side near the tip; digitules of claw extending beyond its tip, slender, with hardly noticeable knobs. Antennæ slender, club not conspicuously swollen, formula 9 (123) (45678), or it might be written as well 9132 (87) (456), but the additional differences indicated by the latter formula are almost too slight to be accurately measured by the eye: 9 is very nearly as long as 7 + 8; 1 is cylindrical, its base not noticeably wider than the apex. The joints have sparse whorls of hairs, 9 having two such whorls. Eyes prominent. Mouth-parts small, mentum (so-called) very obscurely or not

dimerous, broad and short, its apical half with three whorls of erect bristles. Skin with sparse small round gland-spots.

Hab.—Andover, Mass., Oct. 27th, 1896, under a stone in the nest of *Lasius americanus*, Emery. A small colony of five individuals captured, and only one herd as yet found; they were not feeding on any roots entering the nest of the ants, but were altogether on the surface of the nest, and some of the ants were attending them. It is to be presumed that they would eventually produce cottony matter.

Both by colour and habits this differs at once from *P. aceris*, Sign., which has been recorded from Massachusetts, and there is no species with which it is likely to be confounded.

Ripersia Blanchardii, n. sp.

♀.—Dark reddish-purple, segments prominent, much broader in front, pointed behind, subglobular or subelliptical, convex, antennæ short and thick. Length, 2 mm.; breadth, $1\frac{1}{2}$ mm.

♀ (cleared and mounted).—Skin quite thickly beset with round gland-spots, and also minutely hairy, the minute but abundant pubescence being a striking characteristic of the species. So abundant are the hairs in the vicinity of the anal ring that it is impossible to be sure how many really belong to the latter, though there seem to be six, the usual number. The legs, antennæ and mouth-parts are tinged with ochreous, and are large for the size of the insect; particularly the mouth-parts, which have at least twice the diameter, and many times the bulk, of those of the larger species *Phenacoccus americana*. The mouth-parts are also much broader in proportion to their length than in *P. americana*, and the rostral filaments are quite stout. The antennæ are stout, 6-jointed, just about as long as in *P. americana*, but very much stouter and quite different in appearance. The formula is (36) 21 (45), but if anything, 3 is a little longer than 6; 3 about twice as long as broad; 4 and 5 broader at apex than at base, so that the sutures between 3 and 4, 4 and 5, and 5 and 6, are very deep, the last two approaching a right angle. The whorls of hairs are very sparse. The legs are also peculiar; fully a third longer than in *P. americana*, and very stout, with large coxæ and trochanters, they are tolerably thickly beset with small hairs. The tarsus is somewhat over two-thirds the length of the tibia, and tapers quite rapidly from a broad oblique base, it shows a slight tendency to be jointed a little before the

end. Claw large, moderately bent, on one leg minutely notched at the end. Digitules wanting; there is a small bristle in the place of the claw-digitule.

Hab. Haverhill, Mass., Oct. 4th, 1896, in a nest of *Lasius claviger*, Rog., under a stone with a small herd of another species; only one found, not feeding. Named after Mr. Blanchard, who has interested himself in the Coleoptera associated with ants in the same region.

Of the Massachusetts species, this most resembles *R. lusu*, particularly in the antennæ, but it differs widely in its colour, hairiness and stout legs. Still less does it seem to resemble any of the foreign species.

Reviewing the above three species, it seems that the *Lecanopsis* is most modified for an underground life, the *Ripersia* somewhat, but the *Phenacoccus* hardly or not at all. It is probable that the last will be found in summer on some plant above ground.

ARGYNNIS IDALIA IN NEW BRUNSWICK.

On February 1st I happened to spend a few hours in St. John, N. B., and through the kindness of Mr. Herbert E. Goold, of Sussex, N. B., and Mr. A. Morissey, of St. John, I was enabled to visit the very interesting museum of the Natural History Society of New Brunswick. In looking over the cases of insects I noticed two fine specimens of *Argynnis idalia*, which Mr. Goold told me were taken by himself or his father at St. John. I could not remember at the time any record of *A. idalia* having been taken in New Brunswick, so asked Mr. Goold to enquire from his father if he remembered anything of the capture. He has since written to me: "In *re Argynnis idalia*—On my return home from St. John I asked my father about the specimens. He remembered the circumstances of their being caught distinctly, as he was perfectly familiar with the insect, having been one of the most active members of the entomological branch of the Natural History Society of Portland, Maine. In 1880 quite a number of specimens of *A. idalia* appeared in the vicinity of St. John, and the specimens you saw were taken at that time." It is to be deeply regretted that at the present time very few members of the strong local Natural History Society at St. John are studying entomology. The locality is one of extreme interest scientifically, and very much requires working up.

J. FLETCHER, Ottawa.

[In the C. E. for March, 1896, Vol. XXVIII., p. 74, the capture of a specimen of *A. idalia* at Windsor, Ont., is recorded.—ED. C. E.]

ON REARING DRAGONFLIES.

BY JAMES G. NEEDHAM, ITHACA, N. Y.

Field work in Entomology is full of delightful opportunities, and none, just at present, is more inviting, none more certain to repay well even a little effort, none more sure to yield discoveries of scientific value, than work upon the life-histories of Dragonflies.

Of the species occurring throughout the central tier of States, a majority perhaps has now been bred; but of the Canadian, far western and southern species the known nymphs are few and far between.

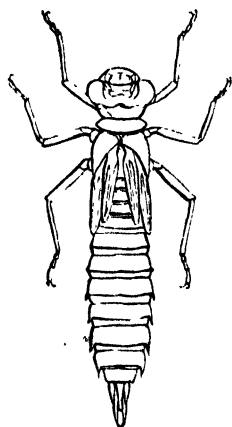


FIG. 15.—AESCHNID NYMPH.

The nymphs (fig. 15), which are all aquatic, have an interesting distribution in depth. Those of *Agrionidae* and of most *Aeschninae* cling to floating or submerged vegetation. These at least every aquatic collector has seen. Those of *Libellulidae* sprawl upon the bottom amid fallen trash. Those of *Gomphinae* burrow shallowly along beneath the film of sediment that lies on the bottom, with the end of the abdomen turned up for respiration.

It is very easy to collect them, especially in spring. A garden rake with which to draw ashore the stuff to which they cling and a pail of water in which to carry them home is all the apparatus desirable at that season. Later, when a new growth of weeds is rooted fast to the bottom, the rake will have to be exchanged for a water-net. Withdrawn from the water, the nymphs render themselves evident by their active efforts to get back, and need only to be picked up. The number of species one will find will generally depend on the variety of aquatic situations from which he collects. The places apt to yield the best collecting are small permanent pools, shallow inlets in the shores of lakes, and the places where the trash falls in the eddies of streams.

They are quite as easily reared. I have found common wooden kits and pails half filled with water, with screen or netting covers, entirely satisfactory. A number of nymphs, if near one size, may safely be kept together (excepting only a few notoriously cannibalistic *Aeschninas*: e. g., *Anax junius*), and if not grown may be fed upon such small insects as a net will gather in any pond. A good square meal once a week will keep

them thriving. The water should be reasonably clean. Three things should be carefully observed. (1) There must be a surface up which they can climb to transform: if the sides of the kit are too smooth put in some sticks; (2) there must be room enough between the netting cover and the water for complete expansion of their wings; (3) they must remain out of doors where the sunshine will reach them. This last point especially is essential to success. But there is still an easier way to do it, and one which, when a species is very common, will prove entirely satisfactory. The several nymphal stages (excepting the youngest, not likely to be collected) are very much alike. I am in the habit of preserving the younger nymphs and putting into my kits only those well grown, as shown by the length of the wing-cases, which should reach the middle of the abdomen. But if, when a species is becoming common, one will go to the edge of the water it frequents, at the time of its emergence, one may find nymphs crawling from the water, others transforming, imagoes drying their wings, and others ready to fly, and may thus obtain in a few minutes the material necessary for determining nymph and imago. The time of emergence may be determined by noticing at what time pale young imagoes are seen taking their first flight, and then going out a little earlier. The unfortunate thing about it is that many of the larger species transform very early in the morning, and to take such advantage of them one must be on the ground between daybreak and sunrise.

Several imagoes should be kept alive until they have assumed their mature colours. It is most important that each imago and its cast skin should be kept together.

Eggs, also, are easily obtained. Every collector has seen the female of the species figured on the front of this magazine, or of related species, dipping the tip of her abdomen into the surface of the water, depositing eggs. If the ovipositing female be captured, held by the fore wings, leaving the hind wings free, and "dipped" by hand to the surface of clean water in a vial or a tumbler, an abundance of eggs will usually be liberated. Eggs of those species which possess an ovipositor and which place them within the tissues of plants may be obtained by collecting the stems in which they have been inserted.

Eggs and nymphs should be dropped in boiling water for a minute and then preserved in alcohol. Imagoes, if mounted, should have a wire or bristle inserted into the body its entire length to prevent otherwise

certain breakage, or if placed unmounted in envelopes, these should be of soft paper, loosely packed, so that the eyes will not be crushed.

In my own field work upon Dragonflies I try to cover for each species the points of the following outline :

I. Imago.

- (1) Name ; locality ; date ; occurrence ; etc.
- (2) Haunts : places frequented ; places avoided ; the reasons, if discoverable.
- (3) Flight : its hours ; its duration ; its directness ; average altitude ; places of rest : altitudes.
- (4) Food : its kind ; how obtained ; where eaten.
- (5) Enemies : what are they, and how do they destroy Dragonflies ?
- (6) Oviposition : does the ♀ oviposit alone or attended by the ♂.
- (7) The eggs : where placed ; number in a place ; incubation period.

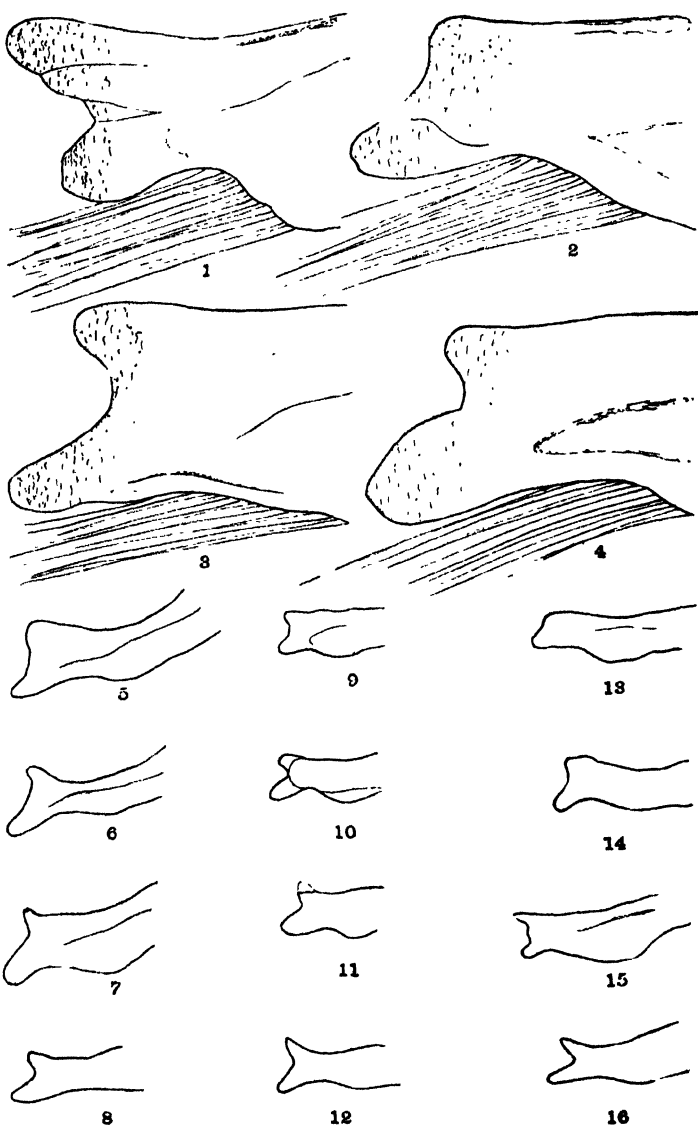
II. The Nymph.

Points 1, 2, 4 and 5 of above, and Imagination : hours ; places ; distance from water ; etc.

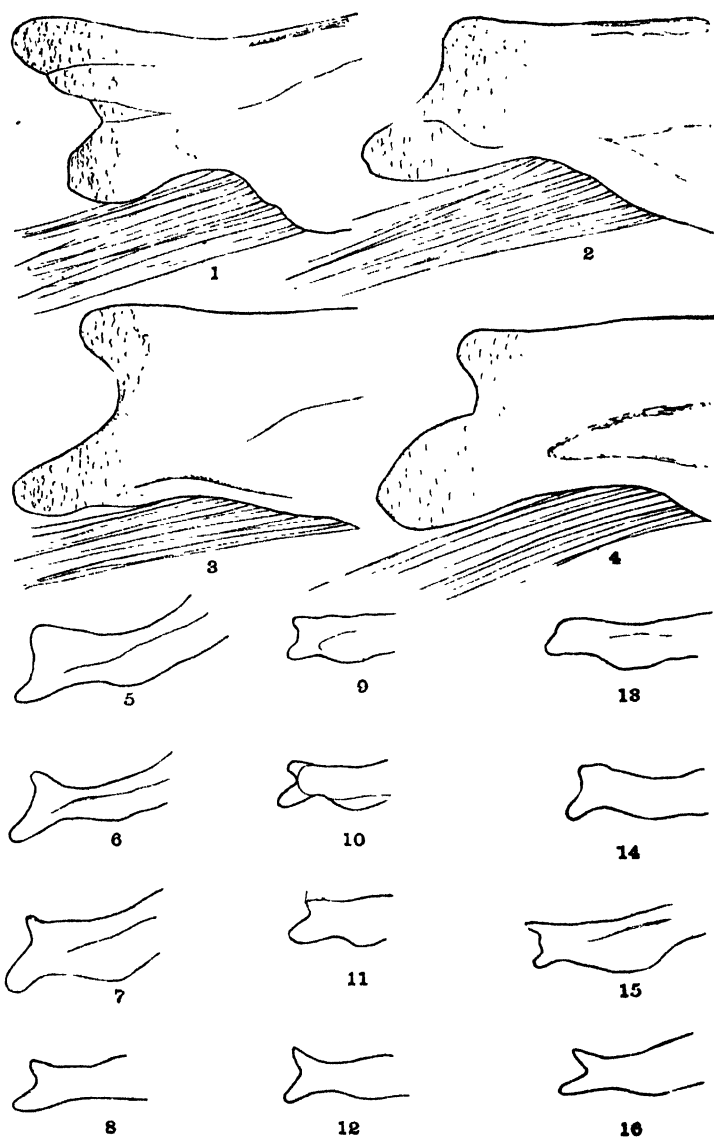
I shall have to admit at once that it is very difficult to determine all these points for a single species, but the effort will lead on into delightful intimacy with these beautiful insects.

At the kind invitation of the editors, I venture to say to the readers of this magazine that I am now engaged upon a semi-popular monograph of N. American Dragonflies, which, in so far as it includes accounts of habits and life-histories of the species, must of necessity be a co-operative work. And I have written this to invite co-operation. The foregoing simple methods are the very best. I will furnish (if desired) half a dozen named nymphs of typical genera to any one who will undertake to collect and rear others. I shall be very willing to determine nymphs or imagoes for any one, and to point out for description such as are new. But I especially desire that accurate field observations and notes be made on many of our species of which we now know only the names, and to such observers I will give all possible aid.

THE ANNUAL REPORT of the Entomological Society of Ontario for 1896 is now in type and will soon be ready for distribution.



GENITALIA OF CALLIMORPHA.



GENITALIA OF CALLIMORPHA.

The Canadian Entomologist.

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No. 5.

CALLIMORPHA AGAIN

Larva of Haploa fulvicosta and notes on the male genitalia.

BY HARRISON G. DYAR, PH. D., NEW YORK.

The difficulty of defining species in this genus is increased by the constancy of the local forms or races. I have elsewhere referred (*Ent. News*, VII., 218) to the race of *fulvicosta* which Mr. O. D. Foulks has discovered at Stockton, Md. Mr. Foulks was so kind as to send me over 100 hibernated larvæ, from which I bred a long series of moths. The type form is large, the size of *reversa* and *colona*, both wings immaculate yellowish-white, head, collar and the tips of the abdominal rings ochre yellow.

In *var. A* the fore wings are nearly pure white, the hind wings much yellower, suggesting *conscita*, though never so dark as that form.

In *var. B* the ground of fore wings is white, marked faintly with ochreous bands in which the full pattern of *colona* can be traced; the costa is narrowly brown-black; the hind wings are pale ochreous. This looks like a washed-out *colona*, related to it in the same way as *var. A*. is to *conscita*.

Var. C is only slightly yellowish on both wings, the hind wings scarcely at all darker; fore wings marked with various streaks and spots of brown-black, especially along the costa and margins, all more or less distinctly connected by ochreous shades, in which the full pattern of *reversa* can be read. This is a washed-out *reversa*, stained with the creamy yellow so characteristic of the Maryland race.

All these forms insensibly intergrade. I believe that this is practically the extent of variation in this Maryland race. There are no specimens that are true *colona*, *conscita* or *reversa*, but these forms are all strongly suggested. The view naturally presents itself that these names apply to local races rather than to distinct species. In his work on *Callimorpha* (*Proc. U. S. Nat. Mus.*, 1887, p. 338) Prof. J. B. Smith describes the genitalia of *colona*, *Lecontei*, *contigua*, *reversa* and *vestalis*. The differences shown are at best slight, and Prof. Smith assumes the

forms which he figures to be constant. In fact, they are not so. I have drawn the right side pieces of four males of the Maryland race of *fulvicosta*. They are shown in figures 1 to 4, viewed from within $\times 50$, the dorsal angles down. These are not specimens selected for their variation, but are all that were mounted. The only selection applied was in taking the poorest specimens for dissection. Fig. 1 shows the upper angle produced and rounded, the lower angle much more produced; fig. 2 shows the lower angle not produced, but simply rounded; fig. 3 both angles produced, the upper the most so; fig. 4 both angles produced, but the lobes of quite different shapes. There is as much variation in these specimens of *fulvicosta* as in all of Prof. Smith's "species," and I am of the opinion that the genitalia are valueless as a means of specific distinction in *Haploa*. However, I add drawings of most of the other forms and also reproduce Prof. Smith's figures.

It is possible that the larvæ, when fully known, will be of more help, yet this is doubtful, as they seem to possess all the same habits and hence are not markedly different in their colours. Very full descriptions are needed, especially of the mature larva, to test these points. The following observations were made on the larvæ sent by Mr. Foulks and on the young ones bred out of the eggs from the moths.

Normal number of stages six; hibernation in the fourth or fifth. The young larvæ that were selected for observation passed two interpolated stages between the normal II. and III. and died before reaching stage IV.

Egg.—Of the shape of two-thirds of a sphere, scarcely conoidal, the base flat; smooth, shining, rather dark yellow; diameter .6 mm. Reticulations obscure, visible in a strong reflected light, very narrow, linear, irregularly hexagonal, the cell areas flat, uniform, no shadows.

Stage I.—Head high, bilobed, the lobes blackish brown, clypeus pale, mouth brown; width .3 mm. Body pale yellowish, tubercles dusky pearly; hair short, stiff, white. Setæ single, normal, no subprimaries; feet pale. The larvæ grow considerably, becoming long and slender, the tubercles surrounded narrowly by brown.

Stage II.—Head black, shining, clypeus whitish, jaws brown; width .45 mm. Body whitish, warts rather small and with the shields deep shining black; hairs not numerous, but forming true warts, short, bristly, black. A wide space between tubercles i. suggests a dorsal band. Warts each narrowly edged with brown, most distinctly subdorsally, no connected marks. Subventral hairs pale.

Stage III. (interpolated)—Head shining black, clypeus and mouth brown; width .55 mm. Warts large, black, hairs short, bristly, black and white. Body elongated, broadly whitish between warts ii., fading to smoky black in the region of wart iii.; below this another pale band, marked with yellow, transversely annulated streaks behind wart iv., two on each segment; subventral region shaded with brown. Leg plates black. Later the appearance is more as in the next stage, though the bands are not really defined.

Stage IV. (interpolated) — Head black; width .65 mm. Body black, a broad diffuse dorsal gray line, joining a narrower subdorsal one. Region of warts iii. and iv. yellow spotted, joining a substigmatal gray band and subventral gray marks. Warts black; hair short.

Stage V. (normal III.)—Black; head .75 mm. Pale whitish dorsal, subdorsal and substigmatal lines, the subdorsal faintest; bright yellow superstigmatal line, not perceptibly joined to the substigmatal one. Warts black.

Normal Stage V. (from Mr. Foulks; after hibernation) — Head shining black; width 1.7 mm. Body black; dorsal line broad, subdorsal faint, stigmatal broad, substigmatal fainter, yellow, traces of a line subventrally, all more or less white spotted. Essentially as in the next stage.

Stage VI—Head and warts shining black, the latter bluish; width 2.7 mm. Body deep black, the dorsal line broad, straight, narrowly broken in the incisures and centre of the segments, yellow, darker yellow or red in the centre of each segment, faint on joint 2. Traces of a subdorsal band, broken by wart ii., whitish, mottled. Lateral band broad, indented by warts iii. and iv., broken into three or four spots on each segment by transverse black lines, yellow, irregularly stained with darker yellow, connected inferiorly by mottlings and dots with a narrow substigmatal line which is yellow, mottled, broken and runs between warts iv. and v. Traces of a subventral line between warts v. and vi. on the base of each leg. Leg plates black. Venter broadly pale gray, blackish dotted. Hair very short, inconspicuous, black or black and white, stiff, pointed, not barbed. In some individuals the subdorsal whitish dots are absent, and in some the dorsal band is distinctly marked with red; otherwise there is very little variation. Corresponds well with Saunders's description of *reversa* (CAN. ENT., I., 20), and also with Riley's of *fulvicosta* (Third Report Ins. Mo., 134). The forms *colona* and *conscita* have not been bred.

Explanation of Plate iv.

- Figs. 1 to 4.—Side pieces of male genitalia of *Haploa fulvicosta* seen from within ; four examples, specimens from Maryland.
- Fig. 5.—The same, *H. clymene*, specimen from Kansas.
- Fig. 6.—The same, *H. reversa*, specimen from Texas.
- Fig. 7.—The same, *H. colona*, specimen from Texas.
- Fig. 8.—Copied from Smith's figure of *H. colona*.
- Fig. 9.—Side piece of male *H. lecontei*, var. *militaris*, specimen from Iowa.
- Fig. 10.—Copied from Smith's figure of *militaris*.
- Fig. 11.—Side piece of *H. vestalis*, specimen from Iowa.
- Fig. 12.—Copied from Smith's figure of *vestalis*.
- Fig. 13.—Side piece of *H. confusa*, specimen from Northern New York.
- Fig. 14.—Copied from Smith's figure labelled *confusa* on the plate, but described as *reversa* in the text.
- Fig. 15.—Side piece of *H. contigua*, specimen from New York.
- Fig. 16.—Copied from Smith's figure of *contigua*.

SOME ANTS AND MYRMECOPHILOUS INSECTS FROM TORONTO.

BY GEO. B. KING, LAWRENCE, MASS.

During the summer of 1896 I received specimens of ants collected by Mr. R. J. Crew, of Toronto, in exchange for such Coleoptera as I could find for him in my locality. He writes me that he noticed no insects with the ants other than the Coleoptera and some aphids in a nest of ants, but did not capture any.

I have found, however, upon looking them over, they contain several very interesting species of various orders : some truly myrmecophilous, some occasional, while others were brought into the nests by the ants, to be used by them for food ; this will apply to a number of Hemiptera collected by *Formica subsericea*, Say.

It may appear to some who are collecting ants'-nests Coleoptera only that the finding of *Agonoderus pallipes*, Fabr., and *Otiorhynchus oratus*, L., is merely occasional. The position in which these Coleoptera are found with the ants here in Massachusetts, and the frequently finding them with various species of ants, lead me to believe that they are more than incidental or casual visitors.

I am not familiar with the scattered literature treating upon the

Formicidæ found in Canada. I will give, however, all that I know of, taken from Dr. Dalla Torre's Catalogue of Hymenoptera, Vol. vii., 1891 :

Stigmatomma binodosum, Prov.

Pogonomyrmex badius, Latr.

Leptothorax Canadensis, Prov.

Dolichoderus borealis, Prov.

Dolichoderus oblitteratus, Scudd.

Formica arcana, Scudd.

Mr. Crew has not as yet found any of the above species at Toronto. The following is a list of those found by him :

Tribe CAMPONOTIDÆ.

Camponotus ligniperdus, Latr., var. *pictus*, For.

“ *herculaneus*, L., sub-sp. *pennsylvanicus*, Deg.

“ *marginatus*, Latr., var. *nearcticus*, Em.

Formica rufa, L., sub-sp. *integra*, Nyl.

“ *exsectoides*, For.

“ *pallide-fulva*, Latr., sub-sp. *Schaufussii*, Mayr.

“ *pallide-fulva*, Latr., sub-sp. *nitidiventris*, Em.

“ *fusca*, L., var. *subsericea*, Say.

“ *lasioides*, Em., var. *picea*, Em.

Lasius niger, L., var. *americanus*, Em.

“ *niger*, L., var. *neoniger*, Em.

“ *flavus*, De G., sub-sp. *myopes*, For.

“ *claviger*, Rog.

Tribe DOLICHODERIDÆ.

Tapinoma sessile, Say.

Dolichoderus plagiatus, Mayr.

“ *Taschenbergi*, Mayr.

Tribe PONERIDÆ.

Ponera coarctata, Latr., sub-sp. *pennsylvanica*, Buckl.

Tribe DORYLIDÆ.

Solenopsis molesta, Say.

Myrmica scabrinodis, Nyl., var. *sobuleta*, Meinest.

“ *scabrinodis*, Nyl., var. *Schencki*, Em.

Cremastogaster lineolata, Say.

The following are the miscellaneous insects found with Mr. Crew's collection of ants sent me.

Coleoptera.

CARABIDÆ.

Stenolophus conjunctus, Lec.—With *Myrmica scabrinodis*, Nyl., var. *Schencki*, Em.

Agonoderus pallipes, Fabr. — With *Myrmica scabrinodis*, Nyl., var. *Schencki*, Em.

OTIORHYNCHIDÆ.

Otiorhynchus ovatus, L.—With *Formica fusca*, L., var. *subsericea*, Say.

I have found this species in Massachusetts with :

Formica fusca, L., var. *subsericea*, Say ;

Aphaenogaster fulva, Rog.; and

Lasius americanus, Em.

STAPHYLINIDÆ.

Scopæus exiguus, Er.—With *Formica fusca*, L., var. *subsericea*, Say.

Aleocharini g. et sp.—With *Solenopsis molesta*, Say.

PSELAPHIDÆ.

Ctenistes piceus, Lec.

SCYDMENIDÆ.

Scydmaenus bicolor, Lec.

These two last species were collected by Mr. Crew in company with ants ; but he did not at the time of capture deem it important to save any, so we cannot give the names of the ants. *C. piceus* was found March 23, 1895, and *S. bicolor*, Dec. 4, 1895.

Hymenoptera.

PROCTOTRYPIDÆ.

Proctotrypes californicus, Holmgr.—With *Formica fusca*, L., var. *subsericea*, Say. This, with a few other species of my own finding, are in the collection of the National Museum at Washington, by request of Prof. Howard.

ANDRENIDÆ.

♀ *Halictus confusus*, Smith.—With *Formica fusca*, L., var. *subsericea*, Say.

CYNIPIDÆ.

♀ *Figitodes 5-lineatus*, Say.—With *Tapinoma sessile*, Say.

I have found *Aphaenogaster fulva*, Rog.; *Lasius flavus*, L., and *Lasius americanus*, Em., to collect oak galls late in the fall. Two individuals came out of one lot of galls collected by *L. flavus*, L., in about two weeks after I collected them, and have been determined by Mr. Ashmead as *Periclistus piratus*, O. S. The ants lap the galls,

Diptera.

STRATIOMYDÆ.

Nemotelus globus, Low.—With *Tapinoma sessile*, Say.

MUSCIDÆ.

Ochthiophola polystigma, Meigen.—With *Tapinoma sessile*, Say.

Hemiptera.

CICADIDÆ.

Nymph of *Tettigonia*, sp. — With *Myrmica scabrinodis*, Nyl., var. *Schencki*, Em.

NABIDÆ.

Larva of *Coriscus*, probably *ferus*. — With *Formica fusca*, L., var. *subsericea*, Say.

LYGÆIDÆ.

Nysius thys, Wolff.—With *Formica fusca*, L., var. *subsericea*, Say.

CAPSIDÆ.

Miris affinis.—With *Formica fusca*, L., var. *subsericea*, Say.

THRIPIDÆ.

A handsome species of *Thrips*.—With *Camponotus nearcticus*, Em.

ARANEINA.

Furolithus, sp.—With *Tapinoma sessile*, Say.

Quite a large quantity of a yellow seed unknown to me came in a mixed lot of ants in one vial. Mr. Crew states that he does not remember mixing any of the species found, but put each colony into separate vials. The following are the species from one vial, that contained the seeds :

Formica pallide-fulva, Latr., sub-sp. *nitidiventris*, Em.

Formica fusca, L., var. *subsericea*, Say.

Formica lasioides, Em., var. *picea*, Em.

Myrmica scabrinodis, Nyl., var. *Schencki*, Em.

The last species seemed to predominate greatly in numbers. So far as I know, this is the first time that any of the species here mentioned have been listed as being found in company with ants. In the determination of these insects I have received valuable assistance from Prof. Herbert Osborn, Prof. L. O. Howard, Mr. Ashmead, Mr. Coquillett, and Mr. Blanchard ; and not only for these, but for many others not yet published that I have found to inhabit ants' nests in Massachusetts.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

We have great pleasure in announcing that a branch of our Society has recently been formed in the City of Quebec, with the following officers :
President—Rev. T. W. Fyles, F. L. S., Professor of Biology in Morrin College.

Vice-President—Miss Macdonald, Principal of the Girls' High School.
Secretary-Treasurer—Col. Crawford Lindsay.

Council—Messrs. D. H. Gregg, Richard Turner, J. E. Treffry, Miss Bickell, Miss Winfield.

With such an enthusiastic and experienced entomologist as the President, and such an able corps of officers, the Branch will no doubt do excellent work, and serve to unite together all those interested in this department of natural science in the neighbourhood of Quebec. We trust that the new Branch may have a long and useful career.

The Toronto Branch of the Society held its first annual meeting on Friday, April 2nd, in its room, 451 Parliament street. The election of officers for the ensuing year resulted as follows :

President —Mr. E. V. Rippon.

Vice-President—Mr. R. J. Crew.

Secretary-Treasurer—Mr. Arthur Gibson.

Librarian-Curator—Mr. T. G. Priddey.

Council—Messrs. C. T. Hill and C. H. Tyris.

The reports of the Secretary-Treasurer and the Librarian-Curator for the past year were read and adopted. They stated that twenty-four regular meetings had been held, at which papers relating to the study of insects were contributed by the members. The number of volumes in the library, including bulletins, pamphlets, etc., is 98, all relating to entomology, and all gifts to the Society. A fair collection of insects has already been formed through the kindness of members in presenting specimens, and will no doubt be largely increased during the coming season. The finances of the Society were shown by the Treasurer's report to be in a satisfactory condition.

The President, in his address, congratulated the members on the good work done during the year, and on the success which had attended the Society's operations. He hoped that during the coming season each member would take a special interest in some particular species of insect, and would endeavour to work out its life history ; he also trusted that much attention would be paid to the study of those species which are beneficial or injurious to mankind.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXIII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(*Continued.*)

TETROPIUM, Kirby.

This genus is easily recognized among its neighbours by the fact that the eyes are divided by a deep emargination into an upper and a lower portion, these parts being connected only by a narrow band from which the granulations or lenses have been lost. The Canadian *T. cinnamopterum*, Kirby, is brown, the wing-covers often much lighter than the head and thorax; the entire body is pubescent. Length .50-.70 inch. The head and thorax are slightly shining, distinctly punctured, the punctures regular, usually close but distinctly separated. Elytra opaque or extremely feebly shining. Sculpture much finer than that of the prothorax. The sexes differ especially in the somewhat shorter antennæ and the broader and more strongly rounded prothorax of the female. The species occurs on or under bark of pine logs.

ASEMUM, Esch.

Two species are recorded from Canada. They are stout brown insects with short antennæ (from about one-third to one-half the length of the body), elytra sometimes yellowish. The thorax is about as broad, in its widest part, as the base of the elytra; the punctuation coarse and close on the pronotum, much finer on the wing-covers. The principal differences separating the two forms must be looked for in the prothorax, which is rounded on the sides in *mæstum*, Hald., and distinctly angulated near the base in *atrum*, Esch. The distinctness of the elytral costæ seems an evanescent character, since certain specimens of the former species approach the latter very closely in that respect. In length *A. mæstum* (fig. 16) ranges from .45 to .60 inch, while specimens of *atrum* are known which slightly exceed the greater measurement and others which scarcely reach the lesser. In the larval stage *A. mæstum* is known to infest pine and spruce, and the beetles may be found on lumber piles.



FIG. 16.

CRIOCEPHALUS, Muls.

Contains larger species than the preceding genus, with coarsely granulated eyes which are not hairy. The prothorax is variably sculptured, sometimes roughened and with deep impressions on the disk.

Two are recorded from our region. They are both rather elongate brown insects and separate thus :

Thoracic impressions deep, elytra finely punctured, third joint of hind tarsi two-thirds longer than wide, emarginate for about one-half its length. Sides of prothorax rounded, somewhat roughened.

.90-1.10 in. *agrestis*, Kirby.

Thoracic impressions fainter, elytra coarsely punctured, third joint of hind tarsi about as long as wide, cleft nearly to the base.

Prothorax very finely punctured, sides rounded, hardly roughened.

.94 in. *obsoletus*, Rand.

These insects are found about lumber piles in the northern and mountain regions of North America. *C. agrestis* is known to depredate on pine and spruce.

PHYSOCNEMUM, Hald.

P. brevilineum, Say, is .50-.75 inch long, black, somewhat shining, elytra sometimes bluish or with a faint reddish tinge along the suture. The upper surface is uneven, the prothorax with deep median longitudinal impression which is convex at bottom and limited on each side by an elevation, which is smoother than the external thoracic margin. Elytra distinctly closely punctured and ornamented with a few narrow, short, raised white lines; the median region on each wing-cover is depressed and limited exteriorly by a smoother linear area, which extends from the humerus towards the apex. Thighs suddenly and strongly dilated near their tips. Hind legs very long. The larva is known as an elm borer.

RHOPALOPUS, Muls.

An easily recognized species, *R. sanguinicollis*, Horn, belongs here. It has been found on cherry trees. Length .62-.75 inch, colour black opaque, surface granulate; prothorax red, tips of elytra sometimes brownish. The thighs are less suddenly clavate than in *Physocnemum*, and the tibiae are stouter. The extreme shortness of the prothorax will separate it easily from most of its neighbours.

GONOCALLUS, Lec.

Differs from the adjoining genera by the slender thighs. *G. collaris*, Kirby, is black, shining, elytra sometimes with metallic lustre or clouded with fuscous, the prothorax red, legs sometimes reddish. The upper surface is punctate, the antennae very slender. Length .35-.47 inch.

PHYMATODES, Muls.

Contains a number of species, all of rather small size and usually bright colour. The prothorax is rounded, usually sparsely punctured and shining. Elytral punctuation distinct, often rather coarse, surface usually shining. The following arrangement of species is taken from Mr. Leng's synopsis :

A. Elytra without narrow cross-bands.

b. Thorax dark, elytra of lighter shade before the middle.
.35-.50 in. *dimidiatus*, Kby.

bb. Thorax rufous with broad black stripe. .25 in. . . *maculicollis*, Lec.

bbb. Thorax yellowish ; surface metallic.

c. Larger species, .50-.52 in., elytra and legs yellow, more or less marked with blue. *variabilis*, Linn.

cc. Smaller species.

Elytra blue, antennæ dark. .20-.32 in. . . *amænus*, Sav.

Elytra piceous, thorax with more or less distinct dark lateral blotches. .34-.36 in. *thoracicus*, Muls.

AA. Elytra with two narrow white or yellowish cross-bands.

Usually rufous, elytra dark, except at base. .25-.36 in. (Fig. 17.) *varius*, Fab.

These insects are usually to be met with in beating.

P. variabilis has been recorded as depredating on oaks, while *amænus* bores in grapevines. *P. varius* is believed to live as a larva in black oak, but I know of no breeding record.

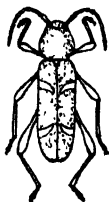


Fig. 17.

CALLIDIUM, Fabr.

Two of the species are metallic green or blue, the other is brown or yellowish. They are mostly flatter than *Phymatodes*, and with heavier antennæ, especially in the male. The colour affords a primary means of separating them, *C. æreum*, Newm., being entirely testaceous or brownish, while *antennatum*, Newm., and *janthinum*, Lec., are metallic blue or green above. The last named has the thorax deeply punctured, not impressed, while in *antennatum* impressions are present and the thoracic punctuation is finer. All the species vary much in size, *æreum* from .34 to .50 inch, while the others run from .25 to .55 inch, *janthinum* averaging a little smaller. It is reported *æreum* has been bred from chestnut, while *antennatum* depredates on pine.

HYLOTRUPES, Serv.

The two species of this genus are very different in appearance. *H. bajulus*, Linn., is blackish, pubescent above, more thickly on the prothorax, where the hair is whitish, almost covering the surface except on the elevated median line and the two raised callosities, which are thus rendered very conspicuous. The elytra have two indistinct transverse fasciæ of whitish pubescence, one in front of the other behind the middle, the latter sometimes wanting. Length, .72 to .88 in. Depredates in pine and juniper. *H. ligneus*, Fabr., is extremely variable, the thorax usually black, less hairy than in *bajulus*, and with five callosities. Elytra yellowish or reddish, with a large blackish blotch occupying usually the apical third, and an elliptical spot of the same colour but varying in size between this blotch and the base. Bores in juniper in the larval state, perhaps also in pine, as the beetle is found on piles of lumber or on freshly constructed fences. Length, .30 to .45 inch.

MERIUM, Kirby.

M. proteus, Kirby, is .45 to .60 inch long, thorax metallic blue or violaceous, shorter than usual, varying in shape according to sex, densely punctured and rather opaque at sides, but shining and with only a few large punctures at middle. Elytra usually greenish metallic, densely and coarsely punctured, generally with two raised longitudinal yellowish lines before the middle, the side margin also yellowish in some specimens. Thighs reddish yellow, except at base and apex, which, with the tibiæ and tarsi, are blackish. Beneath shining black with a violaceous tint.

CHION, Newm.

Here belongs *Chion cinctus*, Drury, a large beetle of a brownish colour (fig. 18), sparsely clothed with whitish pubescence, each elytron usually with an oblique blotch of a yellowish colour near the base. The prothorax is nearly round, and bears a small spine on each side. The elytra are each bispinose at tip. The male antennæ greatly exceed the body in length. The species reaches a size of from .75 to 1.5 inch. It is known to breed in hickory. The name *garganicus*, Fabr., catalogued as a variety, refers to the spotted form.

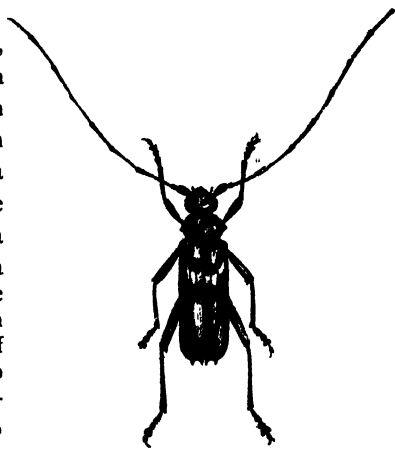


FIG. 18 (after Harris).

EBURIA, Serv.

The two pairs of raised white spots (looking like Ichneumon eggs) on each elytron will easily serve to distinguish this genus. The only Canadian species is *E. quadrigeminata*, Say, which is of a yellowish colour, the thorax with sharp lateral spine and two distinct discal callosities. The elytra are bispinose at apex, the middle and hind femora have each two long spines at tip. The ivory spots of the elytra are situated on the costæ, the outer one of each pair being the larger, this difference in size being much better marked in the posterior pair. Length, .90-1.20 inch. Breeds in hickory, ash, and honey locust.

ROMALEUM, White.

Contains two large species, among the most bulky of the Canadian Longhorns. Both are pubescent insects of robust build, the prothorax rounded at sides and without lateral spine, the elytra spinose at apex, tip of thighs unarmed, antennæ spinose internally. *R. rufulum*, Hald., is fulvous with uniform pubescence of the same colour. Length, .88-1.15 in. *R. atomarium* is darker, brownish, with irregularly mottled pubescence, and reaches a slightly larger size. It has been found under bark of walnut, while the larva has been bred up on hackberry.

ELAPHIDION, Serv.

The Canadian species of this genus are smaller and less robust than the preceding, and may be distinguished therefrom by that character alone. *E. villosum* is the well-known oak-pruner, and does, at times, considerable damage by ovipositing in twigs of oak trees, the larvæ then eating out the inner portion, so that the twig becomes weakened and may be blown off in a strong wind. Its depredations are not confined to oak, however, as Mr. Chittenden has recorded many other food plants. The table of species is an adaptation of the characters presented by Mr. Leng:

- A. Antennal spines large, thighs spinose at tip, body above with irregular vestiture of gray pubescence. .60-.75 inch.
- AA. Antennal spines small.
 - b. Above clothed with mottled gray pubescence, elytra bispinose at tip.
 - c. Sides of prothorax rounded. .70.....*incertum*, Newm.
 - cc. Sides of prothorax hardly rounded; nearly cylindrical.
 - Prothorax scarcely longer than wide. .70 in. *villosum*, Fabr.
 - Prothorax distinctly longer than wide. .70
in*parallelum*, Newm.

- bb. Above nearly glabrous, shining testaceous. Form very elongate, elytral spines long. .43-.45 in. *unicolor*, Rand.



FIG. 19.



FIG. 20.



FIG. 21.

It is stated that *E. villosum* and *E. parallelum* are not distinct, but they are included in the above table, as their amalgamation has not yet been generally accepted.

The figures 19, 20 and 21 represent the three stages of *E. villosum*.

TYLONOTUS, Hald.

Represented by *T. bimaculatus*, Hald.; of a brownish colour. .45 to .60 in. long. Each elytron with two rather large, somewhat rounded yellowish spots, one in front of the middle, the other sub-apical. The thighs are yellowish except at base and apex, rather strongly clubbed. The antennæ are bisulcate (more distinctly on the third and fourth joints), the thorax is thickly punctured with smoothish median line and two rather large dorsal callosities. The elytra are coarsely, rather sparsely, punctured. Pubescence thin, yellowish. The larva bores in ash; beetles have been found under bark of the white or paper birch.

HETERACHTHES, Newm.

Easily recognized by the elongate form, shining surface and extremely small second antennal joint. The thighs are strongly clubbed, the antennæ long and heavy. *H. quadrimaculatus* is .30 to .45 in. long, brown or testaceous with two paler spots on each elytron, one in front of and one just behind the middle. The pale specimens have the spots indistinct. Head closely, elytra and thorax very sparsely, punctured. Length, .30 to .45 inch. It has been bred from hickory limbs.

GRACILIA, Serv.

G. minuta, Fabr., does not occur on any of the Canadian lists, but has been described and figured (in the CANADIAN ENTOMOLOGIST, vol. xxiii, p. 102), by Mr. J. F. Hausen. His figure (fig. 22) and description are here reproduced. "It is of a uniform reddish-brown, the legs being somewhat lighter, with rather sparse cinereous pubescence, giving it a heavy appearance. The antennæ are ciliate, and the head, thorax and

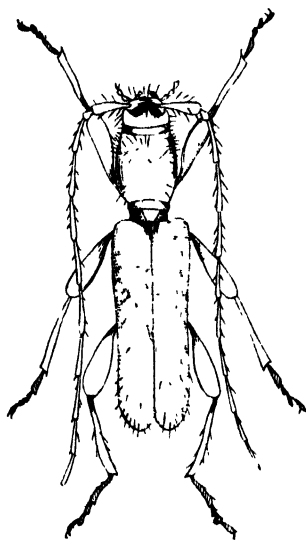


Fig. 22.

elytra furnished with flying hairs. Rather variable in size, .18-.27 in." It was taken by Mr. Caulfield, emerging from a barrel of some kind of dye. The species is supposed to have been introduced from Europe. It has been bred from white birch.

PHYTON, Newm.

A small pale insect, *P. pallidum*, Say, belongs here, and is perhaps doubtfully a true member of the Canadian fauna. It is a trifle under one-fourth of an inch long, of a yellowish colour, the prothorax broad in front of the middle, but narrowed in front and (much more so) behind, the surface with indefinite darker markings. Elytra with four oblique brownish bands, of which the one just behind the middle is broad, the remainder narrow. I have beaten it from

palmetto blossoms in Louisiana. It has been bred from hickory and from *Cercis canadensis*.

OBRIMUM, Serv.

The only Canadian form is *O. rubrum*, Newm., which is one-fourth of an inch in length, shining reddish-testaceous, the head broader than the prothorax, which bears an obtuse dilatation each side near the middle, and has the base and apex nearly equal. The elytra are more closely punctured than the thorax. Thighs strongly clubbed.

NOTES ON PHILÆNUS.

BY CARL F. BAKER, AUBURN, ALABAMA.

Philænus spumarius, L. — From various localities in the New England States I have large series of the typical form of this species, and also specimens representing the well-marked varieties, *leucocephala*, L., and *lineata*, Fabr.

Philænus abjectus, Uhl. — A portion at least of the material recorded under *Lepyronia angulifera* in the Prelim. List Hemip. Colo. belongs to this species. I have taken it at Fort Collins, Colo., and in the adjacent foothills, in May and June. The specimens from this locality are uniformly darker than the type.

Philænus lineatus, L.—I have a large series of this species from the North-eastern U. S., the specimens of which are identical with the typical European form. It seems probable that true *lineatus* is confined to the Eastern U. S. In American publications three distinct species have been confused under this name,—true *lineatus*, the *bilineatus* of Say, and a new species from New England which I shall call *americanus*.

The genus presents two types of elytral venation, one simple and regular, with three or four distinct apical cells, while in the other the elytra are distally irregularly reticulated. *Lineatus*, *spumarius*, *campestris*, *exclamationis*, etc., fall into the first group, while the second group appears to be strictly American, including *abjectus*, *bilineatus* and *americanus*.

Philænus bilineatus, Say.

1831. Say, Journ. Acad. Nat. Sci. Phila. VI., 304 (*Aphrophora bilineata*).

1872. Uhler, List Hem. Colo. and N. M., 472 (*Ptyelus lineatus*).

1876. Uhler, List Hem. region west of Miss. R., 347 (*Philænus lineatus*, var. *bilineata*).

1877. Uhler, Rep. on Ins. Coll. in 1875, 458 (*Philænus lineatus*).

1878. Uhler, List Hem. Dak., Ind., Mont., 510 (*P. lineatus*).

1895. Goding, Syn. and Cat. N. A. Cercopidae (*P. lineatus* in part).

1895. Gillette & Baker, Prelim. List Hem. Colo., p. 70 (*P. lineatus*).

This is the very common western species, heretofore referred to *lineatus*. Say's colour description is a very good one. It is a larger, more robust species than *lineatus*, with the elytra broader in proportion to the width. The face is very much more strongly convex as viewed from the side than in *lineatus*. There are also other minor differences.

I have specimens of a small male variety from Northern Colorado in which the head and thorax are darker, and the elytra, except the usual costal markings, black.

Philænus americanus, n. sp.

Resembling *bilineatus* in size and form as viewed from above. It has the flatter face of *lineatus*, which it resembles very closely in colour. It, however, differs very markedly in the elytral venation, which is very weak and distally broken up into irregular reticulations. The vertex is longer in proportion to length of pronotum than in *lineatus*. Length, 6 mm.

I have before me nine specimens, all very uniform in characters, sent by Prof. A. P. Morse, of Wellesley College, from the following localities: Dover, Mass., June 26; Wellesley, Mass., Aug. 8; Thompson, Conn., Aug. 4.

TWO NEW PARASITES FROM EUPOEYA SLOSSONIAE.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The two new hymenopterous parasites described below were bred by Dr. Harrison G. Dyar, from the larva and cocoons of *Eupoeya Slossoniae*.

PELECYSTOMA, Wesmael.

Pelecystoma eupoeiæ, n. sp.

♀.—Length, 4.5 mm. Head, thorax and abdomen above brownish-yellow; collar above, the middle mesothoracic lobe anteriorly, the lateral lobes and the metathorax, fuscous or blackish; head beneath mouth parts, pronotum, thorax at sides and beneath, tegulae, legs and venter, white; the tarsi more or less and the femora toward apex with a decided yellowish tinge; stemmaticum dusky, the ocelli pale; occiput with two dusky spots. Antennae 48-jointed, slender, much longer than the body, the scape and pedicel somewhat dusky, the flagellum pale brownish-yellow. Mesonotum smooth, trilobed, the metanotum shagreened. Wings hyaline; the costa, stigma, poststigmatal and basal veins pale yellowish, the other veins dusky; second abscissa of radius about three times as long as the first, the second submarginal cell, therefore, long, longer than the first and almost as long as the third. Abdomen as long or possibly a little longer than the head and thorax united. Segments 1-3 coarsely longitudinally striated, the following almost smooth, but opaque; the first segment is scarcely as long as the second and third united, the third about half the length of the second, the fourth and following shorter, subequal; ovipositor distinctly exerted, scarcely as long as the basal joint of hind tarsi, the tip black. Type, No. 3648, U. S. N. M.

Described from a single female specimen.

CRYPTURUS, Gravenhorst.

Crypturus Dyari, n. sp.

♀.—Length, 6.5 to 8.5 mm. Head and thorax marked with white, the abdomen black banded with white; antennae with a broad white annulus; palpi and legs fulvous. Antennae 29-30-jointed, black; the apex of joint 6, joints 7-11 entirely, and base of 12th joint, white. Clypeus, a spot above, spot on cheeks, anterior orbits extending to back of eyes, collar above, large spot just before the hind angles of pronotum, two abbreviated median lines on mesonotum, spots on mesonotum ridges that extend to scutellum, the scutellum, the postscutellum, the tegulae, a spot

beneath, a large spot on mesopleura just above the mesosternal suture, spot at base of hind wings, the blunt but prominent metathoracic tubercles and rather broad bands at apex of all abdominal segments, white. Head sparsely punctate; thorax punctate, the mesonotum medially somewhat rugoso-punctate, laterally more evenly and less closely punctate, the mesopleura medially with some coarse transverse striæ, just back of which is a smooth polished spot, but above and below closely punctate; metathorax with only the basal transverse carina present and which is sinuate medially, the basal enclosure thus formed finely rugulose, but beyond it the surface is rather coarsely rugose; the white metathoracic tubercles are short, blunt and wider or longer than high. Wings hyaline, the stigma lanceolate, brownish, the other veins black; areolet quadrate in position but open behind. Abdomen shining, but under a strong lens exhibiting a very fine coriaceous punctuation.

♂.—Length, 7 mm. Agrees well with the female, except the face below the antennæ, including the semicircular labrum, is entirely white, the mandibles with a white spot at base, the antennæ entirely black, not ringed with white, 29-jointed, the front coxæ and trochanters whitish, while the hind tibiæ, except near base, their spurs and their tarsi, are black. Type, No. 3649, U. S. N. M.

Described from one male and three female specimens.

The two previous species known in our fauna were described by the writer and from the male sex only. The *males* of these three species may be tabulated as follows:

A. Head and thorax with rufous markings.

Legs rufous; hind tibiæ, except at base, and their tarsi, black; tibial spurs red (Texas).....(1) *C. texanus*, Ashm.

AA. Head and thorax with white markings.

Legs rufous, the coxæ white with black markings; second joint of hind trochanters, tips of hind femora, apical two-thirds of their tibiæ, black; their tarsi, except extreme base of first joint and more or less of the last joint, which are black, white (Michigan).....(2) *C. albomaculatus*, Ashm.

Legs fulvous, anterior coxæ and trochanters white, hind tibiæ, except at base, their spurs and tarsi, entirely black, their femora not tipped with black.....(3) *C. Dyari*, Ashm.

NOTES ON PREDACEOUS HETEROPTERA, WITH PROF. UHLER'S DESCRIPTION OF TWO SPECIES.

BY A. H. KIRKLAND, ASSISTANT ENTOMOLOGIST TO THE GYPSY MOTH COMMITTEE, AMHERST, MASS.

During the month of May, 1896, while making field observations in Malden and Medford, Mass., upon the insects known to attack the gypsy moth (*Porthetria dispar*), I found that many of the common predaceous bugs upon emerging from hibernation greedily availed themselves of the food supply offered by the tent caterpillar and destroyed large numbers of this insect. *Podisus placidus*, *P. serieiventris*, *P. modestus*, *Dendrocoris humeralis*, *Euschistus fissilis*, *E. tristignus*, *E. ictericus*, *E. politus* n. sp., *Meneles insertus* and *Diplodus lividus* were often found feeding upon partially grown tent caterpillars. *Podisus placidus* and *P. serieiventris* enter the tents and prey upon the inmates, but the other species generally attacked the larvæ while they were feeding. The species of *Euschistus* are the least predaceous and it is probable that they naturally feed more upon plants than upon insects.

When feeding, these Pentatomids insert the setæ only, and not the sheath, into the body of the caterpillar. I have watched them very carefully under a hand lens and my observations fully agree with those of Mr. Marlatt, as given in the Proceedings of the Entomological Society of Washington, Vol. II., p. 249. I have seen *P. placidus* extend its setæ beyond the end of the beak to a distance equal to the length of the last rostral joint. When the setæ are inserted in a strongly chitinized part the struggles of the larva often pull them from the sheath. In such cases the beak is drawn through the fore tarsi in the same manner that an ant cleans its antennæ, and thus the setæ are forced back into the sheath. I have also removed the setæ of *P. cynicus* from the sheath by means of a fine needle applied along the labrum and have seen them replaced in the same manner.

In the Report of the Massachusetts Board of Agriculture for 1896 I have published, with illustrations, notes on a part of the early stages and habits of some of these Heteroptera and the life history of *P. placidus*. This insect was first brought to the attention of entomologists through some very interesting notes published by Prof. Saunders in the CANADIAN ENTOMOLOGIST, Vol. II., p. 15. The nymphs of this species, at first thought to be *Stiretrus anchovago* (Fab.) (*fimbriatus*, Say), were found attacking the larvæ of the currant sawfly, *Pteronus ribesii* (Scop.). Walsh,

on page 33 of the volume cited, corrects the identification and refers the insect to *Podisus spinosus* or *modestus* or to an allied species. Later specimens sent to Prof. Uhler (not Ulke) were found to represent a new species and were named *Arma placidum* (CAN. ENT., Vol. II., p. 93). Prof. Saunders also gives notes upon the predatory habits of this insect in the Report of the Entomological Society of Ontario, 1871, p. 31.

I have been unable to find the original description of the species. Through correspondence with Prof. Uhler I learn that he cannot recall the circumstances connected with the publication of the description, were such a description published, and he has very kindly sent me the following characterization of the species together with a description of *Euschistus politus* :

Podisus placidus, Uhler.—“Of a narrower and more oval form than *P. serieventris*, with a head somewhat tapering anteriorly, and rounded at tip instead of being truncated, and with the humeral angles rounded off and very moderately prominent. Colour pale testaceous, stained with pale brown and punctate with darker brown. Head much longer than wide, depressed, remotely punctate, the edge reflexed, brown ; each side of tylus is a slender brown line which is triangularly expanded on the base of the vertex ; occipital margin dark brown in the middle, pale and narrowly callous each side ; a pale callous line extends back from each ocellus ; throat whitish testaceous ; cheeks with a slender black line before each eye ; eyes brown, bordered with testaceous behind ; antennæ pale brown, paler at base and on the last two joints ; the basal joint testaceous, very short, the second longest, third scarcely more than half the length of the second, fourth about three-fourths as long as the second, fifth a little shorter than the fourth ; rostrum stout, pale testaceous, reaching upon the posterior coxæ, the apical joint narrow, about as long as the preceding one, brown. Pronotum with the sides straighter than usual, the lateral margin narrowly callous, pale ivory-yellow, and with a few indented points and small teeth before the middle ; the submargin with a brown line, surface with wavy, transverse pale lines between the pale brown marbling, more generally brown behind the middle ; post-humeral margins slightly sinuated ; anterior margins callous, having a small group of coarse punctures behind each eye ; punctures sunken, brown, mostly not close together in the transverse series ; posterior margin truncate. Scutellum long, bluntly rounded and margined with white at tip, punctures in short transverse series, grouped in about three

spots at base. Corium slenderly bordered with pale testaceous, more broadly covered with brown at base and on the disk, the veins posteriorly yellow; membrane pale bronze. Legs minutely speckled with red, the tibiæ and tarsi a little stained with brown. Under side finely punctate, the sternum with two series of black points. Connexivum depressed, punctate, the outer edge ivory white, callous and marked with two black points at each incisure of the segments; the upper surface yellow, with the black points more linear. Length to end of abdomen, $8\frac{1}{2}$ to $10\frac{1}{2}$ mm. Width of pronotum, $4\frac{2}{3}$ to 6 mm.

"Through the kindness of many friends I have had an opportunity to examine specimens from the Provinces of Quebec, Ontario, and Columbia, in British America; from nearly all of the New England States, besides Illinois, Iowa, Michigan, and Colorado. The genital segment of the male is deeply excavated, and with two short processes on the middle. The tergum is often bright red, which colour becomes brownish in more mature specimens. The humeral angle is usually more or less black. In some specimens there is a series of minute black dots each side of the venter, and a few obscure spots distributed over the ventral surface."

Euschistus politus. New sp.—"Pale dull fulvous, or rufo-fulvous, suboval, with the humeral angles almost rounded and very moderately prominent. Head narrow, as in *E. tristigmus*, Say, deeply and finely punctate, the tylus prominent at tip and a little longer than the lateral lobes, the lateral lobes deeply sinuated, with the outer margin blackish. A black line extends from the eye to base of antennæ; antennæ clay yellowish; the basal joint short, hardly reaching the apex of head, marked with a few black points; second joint longer; third a little longer than the second; fourth longer, dusky at tip; fifth a little longer than the fourth, fusiform, blackish excepting at base; rostrum pale testaceous, slender, with the setæ piceous, reaching to the posterior coxæ. Pronotum much wider than long, polished, closely and finely punctate with brown; the lateral margins very slightly sinuated, smooth, ivory white; the submargins blackish; humeral angles triangularly rounded; posthumeral margins almost straight. An obsolete, callous, imperfect curved line extends between the humeral angles. Scutellum narrow and bluntly rounded at tip, where it is also slenderly margined with white; the surface is less densely punctate in small spots. Wing-covers closely punctate; membrane a little brownish, the veins and numerous dots darker brown. Legs pale yellow, remotely dotted with brown. Beneath pale greenish,

finely punctate, highly polished, the pleura with a row of fine black dots, and an extra dot outwardly; connexivum acute, the intersegmental sutures indented and marked with a black dot. Tergum black, the sutures, exteriorly, with a double black spot. Length to end of abdomen, 9 to 10 mm. Width of pronotum, $5\frac{1}{2}$ to 6 mm. A pair of these insects taken in Massachusetts have been kindly given to me by Mr. A. H. Kirkland. Other specimens have been sent to me for examination from Rhode Island, Pennsylvania, and the District of Columbia. I have found it once, July 4, in a sandy pine woods district in southern Maryland. Only a few specimens have thus far been reported. 'It seems to be of rather uncommon occurrence.'

GRAPTA INTERROGATIONIS.

BY ARTHUR J. SNYDER, N. EVANSTON, ILL.

Under the title "Notes on Vanessa Interrogationis," in the February number of CAN. ENT., Mr. W. F. Fiske gives some interesting statements corresponding to observations made here. I kept bait for moths on the trees in and near my yard from the beginning of the year 1896, and captured Noctuids during January, February, and March.

Diurnals came to the bait for the first time on April 12th. Vanessa Antiopa led the van, followed closely by the Graptas and Pyrameis Atalanta. In a few days *Interrogationis* and *Atalanta* were abundant. *Grapta Comma* appeared on the 17th of April.

April 24th I made the following note in my record: "Previous to this date all the *Grapta Interrogationis* were hibernating specimens and of the form *Fabricii*. This evening (my observations were made from four p.m. 'till dusk) all were of the dark form *Umbrosa*, but also all old hibernating specimens."

On the 25th both *Umbrosa* and *Fabricii* were seen. During the last of April and first part of May Graptas were exceedingly abundant.

On May 7th saw the first Grapta depositing eggs on elm. Captured the ♀ and found it to be *Umbrosa*. A single butterfly procured from these eggs was of the form *Umbrosa*.

Soon the eggs and larvæ of Graptas were abundant on the elm trees and shrubs, especially on the low branches of young trees. One could hardly turn over a bough of one of these without finding several larvæ.

Mr. Fiske came near proving a point concerning which many of us are interested, but the weak point is this: Did he examine the leaves of the branch of elm on which he netted the ♀ *Umbrosa*? If not, how does he know that there were no eggs upon the limb at the time of confining the ♀ there?

I have frequently found upon the same limb larvæ of *Graptas* in several stages of maturity, small ones just hatched, and others almost ready to pupate.

I am inclined to think that *Umbrosa* and *Fabricii* may be obtained from eggs laid by one ♀, just as Mr. W. H. Edwards has succeeded in raising imagoes of *Papilo Oregonia* and *Bairdi* from eggs laid by a single individual.

To prove these points just as we would have them, both sexes should be reared, each form paired with its kind, and *vice versa*, and the results noted. The second generation of specimens thus observed should settle the question.

While I cannot positively answer Mr. Fiske's question as to where the immense number of *Umbrosa* came from, the observations made here go to prove that the uncommon appearance of the species was not confined to one locality, but the "wave" probably extended over the entire eastern United States. It is my opinion that the preceding autumn was an unusually favorable one for the *Graptas*, for both *Umbrosa* and *Fabricii* were common here in August, 1895.

Grapta Comma was very abundant here in the autumn of 1892, but did not appear in great numbers again until the spring of 1896.

Papilio Ajax is very rare here in ordinary years, but in 1895 suddenly great numbers of badly worn specimens appeared and remained for some days. Every collector captured examples, I think, but hardly any one secured a perfect specimen.

The nearest point at which the food plant of *Ajax* is found, so far as I have been able to ascertain, is on the Michigan side of Lake Michigan. In this case the butterflies may have been carried from their usual haunts by winds.

Insects undoubtedly migrate, sometimes suddenly and in immense numbers, as has been noted of *Danaïa Archippus* and *Callidryas Eubule*, and sometimes slowly, taking years to reach a certain locality hitherto unknown to the species.

Chrysophanus Helioides is moving eastward. A few years ago it

was considered a Rocky Mountain species, but lately specimens have been taken in Iowa, Illinois, and Indiana.

Another question is why the form *Fabricii* should appear before *Umbrosa* and then later on both forms appear at the same time?

The broods of *Interrogationis* seem very irregular as to time of appearance, but there are at least two annual broods here.

A NEW CÆLIOXYS FROM NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, N. M.

Cælioxys menthae, n. sp.—♂. Length $9\frac{1}{3}$ mm., black with the legs and base of abdomen ferruginous. Pubescence scanty, dull white, rather dense and tinged with ochraceous on face. Head rather large; vertex shining, with large, well-separated punctures; mandibles bifid at ends, ferruginous except tips and extreme base; antennæ black, flagellum faintly rufescent beneath towards the end; mesothorax shining, with extremely large, well-separated punctures; a band of dull white pubescence at base of scutellum and a patch above base of wings; scutellum shining and sparsely punctured, without any trace of a keel, rounded behind, with a very small tubercle at the middle (representing the median tooth of *aperta*, etc.), lateral teeth large, flattened and rounded at tips; enclosure of metathorax distinct, very finely granular, with a basal series of large pits; tegulae apricot colour; wings dusky hyaline, the apical margin broadly smoky, nervures piceous, stigma fuscous, marginal cell more produced at tip than in *altilis*; coxæ more or less darkened, legs otherwise entirely bright ferruginous, with the pubescence extremely scanty; abdomen shining, segments 2-5 with transverse sublateral grooves; punctures sparse, largest and densest at sides, rather small and numerous on dorsum of first segment, absent on dorsal middle of segments 2-5, except for an apical row and on 2 an imperfect basal one; sixth segment with sparse minute punctures. Hair-bands very narrow and interrupted dorsally, so as to be inconspicuous. First segment except the extreme base entirely ferruginous; second and third segments, and fourth more or less, ferruginous at sides; venter ferruginous except apex. Apex with six teeth, of the terminal ones the lower are the longer.

Hab.—Deming, N. M., at flowers of garden mint in Mrs. Bristol's garden, July 9, 1896. (Ckll. B. 45.) Very distinct by the sparsely punctured (in parts impunctate) abdomen with its rufous first segment. Nearest, perhaps, to *C. texana*, Cr.

There is a *Cælioxys* taken by Prof. Townsend on the Gila R. in numbers, which I could not definitely identify. A specimen sent to Mr. Fox comes back marked "near *mæsta*." Very possibly the species is new, but I do not at present care to give it a name, as there are several closely allied forms which I have not seen, and it may be one of them.

Mailed May 1st, 1897.

Eristalis Meigenii, O. S., West. Dipt. 337 (Yukon River).

Xylota barbata, Loew, Cent. v., 40 (Sitka).

Since none of the species taken by Prof. Dyche duplicate those above, the total number of Syrphidæ known from Alaska is brought up to twenty.

These species are included in their systematic relation below. It has been thought best, however, to place them in ensemble form here.

Chilosia gracilis, n. sp.

Chilosia plutonia, n. sp.

Chilosia alaskensis, n. sp.

Melanostoma mellinum, Linn. I have also seen specimens of the species taken at Ft. Wrangel by Prof. Wickham.

Syrphus intrudens, O. S.

Syrphus mentalis, Williston.

Syrphus protritus, O. S.

Syrphus Lesueurii, Macq.

Syrphus umbellatarum, Schiner.

Eristalis occidentalis, Williston.

Helophilus latifrons, Loew.

Helophilus Dychei, Will.

Xylota ejuncida, Say.

The preponderance of *Chilosia* and *Syrphus* forms which are known to be mountainous is conspicuous; that the three species of the former genus are all new is not surprising considering the state of our knowledge of them in this country. The occurrence of three European species out of the relatively small total number is rather remarkable, and bears out the law of the occurrence of such forms in the West rather than in the East of this country, or at least that where they occur in the East they also occur in the West. That two species of *Helophilus* should be found is entirely as would be expected of such a northern genus; although that one of them should be new, and that in a restricted group of northern forms, which are of almost circumpolar distribution, is noteworthy.

All of this Alaskan material was placed in the form of a rough draft of a paper by Dr. Williston. In a most truly generous spirit he turned the paper with the specimens over to me, advising me to make any changes that I might see fit, and giving me full permission to incorporate it in the present paper. This has been done. The additions of mine are the preceding part, the descriptions of the three new species of *Chilosia*, and several notes.

1. *Microdon viridis*, Townsend, Dipt. Baja, California, in Proc. Cal. Acad. Sci., Series 2, Vol. III., p. 610 (April 8, 1895).

I have received from Prof. Aldrich a single specimen of this characteristic species.

This specimen bears the label "Knoxville, Tenn., 2nd July, '91." In reply to a letter in which I expressed some doubt as to the correctness of this label, Prof. Aldrich has assured me that the specimen was collected by Mr. H. F. Summers in Tennessee and that he has no doubt but that the label is authentic and perfectly correct. The specimen on which Mr. Townsend founded the species was from San José del Cabo Baja, California.

The remoteness of this locality from that of the type was a matter of no little surprise to me and has caused me to make an unusually diligent search of the literature to ascertain whether Mr. Townsend's species might not be the same as some previously described more widely distributed one. I have found, however, that *M. viridis* is entirely unique among the species of *Microdon*, although it approaches *M. devius*, Linn., of Europe.

I found recently in the collection of the Kansas State University another specimen of this species which I have ascertained was taken by Mr. Chas. Robertson at Orlando, Florida, March 16th, 1887.

2. *Microdon megalogaster*, Snow, Kansas Uni. Quart. Vol. I, No. 1, p. 34. Plate vii., Fig. 1 (July, 1892).

Microdon bombiformis, Townsend, Trans. Am. Ent. Soc., Vol. XXII., p. 33 (March, 1895).

I have compared the types of these two descriptions in the collection of the Kansas University; there is not the least doubt but that they are the same. The type of *bombiformis* is a female and that of *megalogaster* is a male of the same species. There is only a difference in size between these two specimens. Townsend states in regard to his species, "I can hardly identify this with *megalogaster*, Snow, from the differences in the wings." The wings in both specimens are fusco-hyaline, but in the female (*bombiformis*) they are perceptibly darker along all of the veins, precisely, however, as might be expected in that sex.

The locality of the specimen described as *M. bombiformis* is Dixie Landing, Va., and that of the specimen described as *M. megalogaster*, which Snow omitted to state, is Illinois.

3. *Chrysogaster pictipennis*, Loew, Centuries, iv., 58.

Numerous specimens of this species were taken by the writer at Cedar Bluffs, in Nebraska. The species has been recorded hitherto only as far west as New York. All of these specimens seem to differ from Eastern ones only in the fact that the wings are less distinctly marked.

TABLE OF THE SPECIES OF CHILOSIA INCLUDED BELOW.

- | | |
|---|-----------------------------|
| 1. Eyes bare | 2 |
| Eyes pilose | 3 |
| 2. Anterior cross vein distinctly bent at base, and parallel to vein at base of the discal cell ; thorax long pilose , opaque black species ; wings very dark | <i>plutonia</i> , n. sp. |
| Anterior cross vein perfectly straight, not parallel to vein at base of discal cell ; thorax very short pilose ; shining olivaceous species ; wings hyaline | <i>gracilis</i> , n. sp. |
| 3. Scutellum with bristles or bristle-like hairs on the margin | 4 |
| Scutellum without bristles on the margin ; tibiæ largely reddish ; wings tinged with yellowish ; white pilose, bluish species | <i>punctulata</i> , n. sp., |
| 4. Face hairy ; thorax white pilose . anterior cross vein oblique ; robust, shining brassy species | <i>pacifica</i> , n. sp. |
| Face not pilose ; thorax black pilose ; anterior cross vein rectangular, deep blue, shining species | <i>alaskensis</i> n. sp. |
| 4. <i>Chilosia alaskensis</i> , n. sp. Plate V., Fig. 4. | |

Everywhere deep blue, shining, very short pilose. Eyes pilose, arista scarcely pubescent, incrassate on the basal half, scutellum with bristle-like hairs.

Female.—Eyes very short sparse pilose, appearing white from above. Front shining blue, sparsely punctured short black pilose, with a large sulcate swollen area above the antennæ. Face very prominent, deeply concave below the antennæ to the rounded, very prominent tubercle situated a trifle below the middle of the eyes, thence shortly but not very deeply concave to the epistomal tubercle which is only slightly less prominent than the upper, and is situated considerably above the lower eye margin. Below the lower tubercle straight, slightly receding. Cheeks narrow, lower border straight, epistoma not truncated at tip. Antennæ and margin of the antennal orifice reddish-yellow, first and second joints and the narrow upper margin of the third brownish. Third joint very large, circular with the upper outer margin slightly less convex,

Arista long, basal, brown, very indistinctly pubescent. Thorax shining blackish-blue, short black pilose. Scutellum with slender bristles on the margin. Abdomen oval, wider than the thorax, everywhere shining dark blue, almost bare. On the dorsum of the abdomen the pile is black, on the margins, especially anteriorly, it is white, and on the sides of the second segment rather long. Legs black, knees and narrow base of the tibiae only lighter, short black pilose. Wings hyaline, the stigma and all the veins light luteous. L. corp. 8 mm., L. al. 8 mm.

One specimen: Cook's Inlet, Alaska; Prof. L. L. Dyche, of the University of Kansas.

5. *Chilosia plutonia*, n. sp. Plate V., Fig. 7, 9.

Allied to *C. Willistoni*. Eyes bare, arista plumose, scutellum with bristles, legs black, second and third abdominal segments opaque except the anterior corners, thorax long black pilose, wings very dark.

Male. - Frontal triangle swollen, but little shining, long black pilose. Ocellar area similarly pilose. Face not pilose, very slightly pollinose, gently concave to the tip of tubercle which is round and distinct, thence only very slightly concave to the tip of the epistoma; but little produced below the eye. Occiput long white pilose below. Antennæ small, black; third joint yellowish-red, a trifle longer than broad, rectangular with the lower basal corner bulging slightly outwardly. Dorsum of thorax and pleura subshining, long, erect, black (in all lights) pilose, finely punctured. Scutellum shining, quite distinctly punctured with bristles and coarse hairs on the margins. Abdomen not wider than the thorax, opaque. There are shining brassy triangles on the anterior angles of the second and third segments; these spots extend about one-half of the width of the segment laterally and about the same distance inwardly. On the fourth segment there is a complete anterior shining band of metallic. Pile of abdomen sparse, long on the lateral margins, on the opaque portions black, on the shining portions whitish. Hypopygium shining, white pilose. Legs entirely black, long black pilose; on the anterior and middle femora the pile is long and slender, forming loose cilia, on the inner side of the posterior femora it is short and spinous. Wings very dark, especially before the anterior cross vein. L. corp. $8\frac{1}{2}$ mm., al. 8 mm.

In some lights the fourth abdominal segment seems almost entirely shining, and the anterior and middle legs seem whitish pilose.

One specimen: Cook's Inlet, Alaska; Prof. L. L. Dyche.

6. *Chilosia Aldrichi*, Hunter. Plate V., Fig. 8, a.

Several additional specimens have been received from the same locality as the type, Idaho.

7. *Chilosia gracilis*, n. sp., Plate V., Fig. 3.

Eyes bare, arista plumose, scutellum with bristles on the margin, legs black.

Female. --Shining black, somewhat greenish, almost bare. Antennæ of moderate size, first and second joints piceous, third bright reddish-yellow, somewhat longer than broad, elliptical; arista black, basal, long loose plumose. Front plane, short luteous pilose, longer black pilose near the ocelli. Face and cheeks bare, shining, lower anterior orbits very short white pilose. Face considerably obliquely produced below, with a conspicuous round tubercle below the middle moderately concave above; between the tubercle and the tip of the epistoma there is a short deep concavity. Occiput white pilose. Dorsum of thorax shining, distinctly punctured, very short black pilose in the middle and yellow pilose around the margins, quite widely so anteriorly. Pleura more olivaceous than the dorsum, shining. Scutellum with two apical and three shorter lateral bristles on each side. Abdomen everywhere shining with a greenish tinge, much broader than the thorax at the apex of the second segment, with short white pile that appears to be arranged in bands on the segments; the lateral margins of the first, second and third segments have longer erect pile. Legs entirely black, the knees, especially the anterior pair, lighter; the pile is very short, sparse, and in most lights white. Wings uniformly grayish hyaline, veins black. Tegulæ white, fringed with somewhat yellowish. L. corp. 6 mm.; al. $6\frac{1}{2}$ mm.

One female specimen: Cook's Inlet, Alaska, 1896; Prof. L. L. Dyche, of the University of Kansas.

This species is very closely allied to *C. Willistoni*. It differs, however, as follows: The tubercle is much more distinct, and between it and the tip of the epistoma there is a short deep concavity. In *Willistoni* the tubercle is so indistinct that between it and the epistoma the outline is almost perpendicular. The face is produced quite distinctly, more downwardly in this species. The pile of the dorsum is black; in *Willistoni* it is luteous. The pile of the abdomen is also much more sparse and finer; in *Willistoni* it is quite uniform and not arranged in bands.

8. *Chilosia pacifica*, n. sp. Plate V., Fig. 2, a.

Male.—Eyes pilose, scutellum with bristle-like hairs on the margin, arista bare, abdomen largely opaque, robust, thickly white pilose.

Female.—Shining brassy, abdomen broad, entirely shining, antennæ brown, third joint reddish.

Male.—Eyes long dense, whitish pilose. Front swollen, sulcate, long black pilose. Face uniformly lightly white pollinose and short, sparse, white pilose below, extending only moderately below the eyes, obliquely truncate at the apex, the lower border of the cheeks straight. In outline the face is almost straight below the antennæ to the inconspicuous, obtuse, nasiform tubercle, thence distinctly concave to the tip of the epistoma, which forms a second tubercle almost as large as the upper one. Antennæ of moderate size, the second and third joints black, third brown on the upper half, yellowish-red below, very slightly broader than long, almost square, the lower outer angle rounded. Arista, bare, basal, black. Dorsum and pleura shining greenish, densely, long, erect whitish pilose. Scutellum with long, bushy, white pile, intermixed with slightly strengthened black hairs on the margin. Abdomen but little broader than the thorax, everywhere long erect whitish pilose, first segment shining, second entirely opaque, third opaque, except a narrow posterior margin and lateral triangles reaching from the anterior margin two-thirds of the width of the segment, of shining green, fourth segment entirely shining greenish. Legs black, long white pilose. The basal third, and the narrow apex of the middle and anterior tibiæ and the basal third of the posterior are dull testaceous. The colouring of the posterior pair is very inconspicuous. Wings grayish hyaline, veins brown, stigma luteous. Tegulæ white. L. c. 10 mm., al. 8 mm.

Female.—Front shining brassy, coarsely punctured, pitted above the base of the antennæ, short white pilose. Along the eye margins, midway between the antennæ and the ocelli, there are short elevated ridges. Face shining greenish-black, short, sparse, whitish pilose below on the sides; the orbital margins densely short, white pilose. Face considerably concave below the antennæ to the conspicuous tubercle, thence with a short, deep concavity to the epistoma, which forms another less conspicuous tubercle, not produced below the eyes nor obliquely at the apex, which is broadly truncate. Lower border of the cheeks slightly concave. Occiput long yellowish pilose. Eyes much shorter pilose than on the male. Antennæ moderate in size, deep brown; third joint reddish-

brown, blackish above, slightly longer than broad, the lower corner slightly less convex than the upper. Thorax shining greenish, short white pilose. Scutellum fringed with rather short white pile, with six slender black bristles arranged as follows: two on each side near the apex, one more slender on each side near the base. Abdomen considerably broader than the thorax, everywhere shining brassy and rather short, dense, short, appressed pilose; on the lateral margins the pile is longer and erect. Legs short, whitish pilose, femora entirely black, except the extreme apex, anterior, and middle coxæ reddish, all the tibiæ obscurely reddish, except a broad subapical band occupying more than a third of the width of the tibiæ, front and middle tarsi reddish, the two apical joints blackish, posterior tarsi entirely blackish. Wings subhyaline, the basal half slightly coloured with yellowish, veins brown, stigma luteous, stumps of veins at the bases of the apical and posterior cross veins.

L. corp. 9 mm., al. 8 mm.

Two specimens: one bearing the label "Cal., R. W. Doane coll.," and the other, "Palo Alto, California, March 29, 1895."

This species is allied to *C. occidentalis*, Will., also from California. It may be distinguished, however, from that species among other characters by the colour of the pile and the presence of stumps of veins at the bases of the apical and posterior cross veins.

9. *Chilosia punctulata*, n. sp. Plate V., Fig. 6, a.

Eyes pilose, arista bare, scutellum wholly without bristles. Everywhere profoundly punctured; wings uniformly, distinctly yellowish.

Female.—Front deeply punctured, wholly without swollen processes, but little shining, pile short, dense, in some lights blackish, from above white. The orbits on the lower part of the front and the upper part of the face expanded as a narrow band just below the base of the antennæ, white pollinose. Face bare, shining black, deeply concave below the antennæ to the conspicuous round tubercle, thence shortly and deeply concave to the oral margin, which is obliquely truncate. Cheeks narrow, bare, shining, lower border straight. Antennæ situate above the centre of the eyes, second and third joints bright reddish-yellow (sometimes more brownish), first and the narrow orifice brownish. Third joint moderate, a trifle longer than broad, regularly elliptical. Arista bare, basal, yellow at apex. Eyes very short, sparse, white pilose. Mesonotum densely punctured but little shining, pile short, whitish, on pleura below the base of the wings longer and white. Scutellum without bristles,

deeply punctured like the mesonotum, with a loose fringe of fine white pile showing from below the margin. Abdomen broadly elliptical, everywhere deeply and conspicuously punctured and subshining. Pile rather abundant, white. When viewed from above and at one side the pile of the third and fourth segments seems to form broad arcuate bands curving from the apical corner of the segment inwardly. Legs white pilose; all the femora except a narrow tip black; tibiae reddish-yellow with an indication of a brown median band, more pronounced on the posterior pair. Tarsi yellow, two apical joints darkened. Posterior femora with several short spinous bristles below near the apex. Wings short, broad, uniformly tinged with yellow; veins yellow.

Length, $8\frac{1}{2}$ mm.; al., $6\frac{1}{2}$ mm.

Two specimens: West Point, Nebraska, September 9.

This species is very closely allied to *C. sororia*, Will., from Mexico and to *C. petulca* from Washington State. In the shape of the antennae and outline of the face it agrees precisely with *petulca* but differs in the absence of the scutellar bristles. This is the only character mentioned by Williston in the *Biologia C. A.* as distinguishing *sororia* from *petulca*. The character, however, in this species which leads me to consider it very distinct is the deep punctuation. The front of *C. sororia* is described as "shining metallic," and the mesonotum as "metallic green," which would certainly indicate that these parts are not deeply and closely punctured. In this species the front and mesonotum are very deeply and conspicuously punctured, so that they have a roughened, granulated appearance and are subopaque. The wings in this species are much more yellowish than the description of *C. sororia* would seem to indicate they are in that species, and there are several other differences.

10. *Melanostoma mellinum*, Linn.

Two specimens: Cook's Inlet, Alaska; coll. L. L. Dyche.

11. *Platychirus chaetopodus*, Williston. Synopsis N. A. Syrphidæ, p. 59, 1896.

Four male specimens were taken on the Pine Ridge in North-western Nebraska by the writer during July, 1896. The species was described from the State of Washington and Snow has recently recorded it from Colorado. The abdominal markings are larger than the description seems to imply.

12. *Syrphus intrudens*, O. S.

Four specimens from Cook's Inlet, Alaska; coll. L. L. Dyche. The

legs are darker coloured than Osten Sacken describes them. This species has been recorded from California and Colorado.

13. *Syrphus mentalis*, Will.

Two specimens : Cook's Inlet, Alaska ; coll. L. L. Dyche. This species is known from the State of Washington. These specimens show a considerable variation from the description and from each other. However, the points in which one specimen differs from the description are the very points in which the other specimen agrees. I am thus led to believe that the species is variable.

14. *Syrphus protritrus*, O. S.

One specimen : Cook's Inlet, Alaska ; coll. L. L. Dyche. This species was described from California.

15. *Syrphus Lesueurii*, Macq.

Two specimens : Cook's Inlet, Alaska ; coll. L. L. Dyche. This species has been recorded from New England and once from the Pacific Coast.

16. *Syrphus umbellatarum*, O. S.

Two specimens : Cook's Inlet, Alaska ; coll. L. L. Dyche. This species has been recorded from New Hampshire to Arizona, but never from the North-west. This record gives the species an immensely increased range.

17. *Baccha clavata*, Fabr.

One female specimen taken on flowers of *Aster multiflorus*, Sept. 28th, 1896. It differs from the description in having two small yellow spots on the first abdominal segment corresponding to those on segments two and three and in lacking the white pile on all except the first. It is without doubt, however, this species. This is the second occurrence of this species at Lincoln, Nebraska. It was previously taken in 1895 under similar circumstances.

XANTHOGRAMMA, Schiner.

The astute Prof. J. Mik (Wien. Ent. Zeit., 1897, p. 65,) has discovered a character that will separate this genus from *Syrphus* as far as the European species of these genera are concerned. He states : " Als ein bezeichendes Merkmal für die Gattung *Xanthogramma* habe ich Form und Farbe der Umwallung (das sind die Klappen) des Metathoracicalstigma (ueber den Hinterhüften) gefunden. Diese Umwallung ist bei allen Arten nicht sehr hoch ; sie ist schwarz und trägt auf dem freien Rande kurze, feine, schwarze oder braune Wimperhärchen."

I have sought in vain to apply this character to the North American species of these genera. I have had, unfortunately, the opportunity of examining but one species of *Xanthogramma*, *X. flavipes*, Loew, and it is quite possible that the other species of the genus may differ from it in precisely this respect. However, it is important that the character that will separate all of the European species of these genera finds its exception in this one North American species at least.

In the absence of a positive illustration of the character used by Prof. Mik, I have had some difficulty in conceiving exactly what he means. I take it, however, that the "Umwandung" is the elevated orifice of the metathoracical spiracle and the "Klappen" are the lids fitting over them and bearing on their free edges cilia of the fine black or brown bristles. If I am right in this, the character does not apply at all to *X. flavipes*. The orifice of the spiracle is not in the least elevated more than in any of the fifteen species of *Syrphus* which I have examined with special reference to this character, and the cilia is not black or brown, but only slightly yellowish.

18. *Baccha lemur*, O. S.

Four specimens: Colorado Springs, Colo., Aug. 1896; Prof. Bruner.

These specimens show no variation among themselves, nor differences from the description. The posterior femora uniformly have only an indication of a preapical ring.

19. *Volucella apicifera*, Townsend, Trans. Am. Ent. Soc., 1895, p. 40.

One male specimen, Las Cruces, New Mexico; coll. Townsend, April 8, now in the collection of Prof. Aldrich I have examined. The type of this species, which I have also examined in the collection of the Kansas University, which was taken at Las Cruces, N. M., April 17, and this specimen agree throughout. This species is certainly, as Mr. Townsend states, very closely allied to *V. isabellina*, Will. It differs in some respects in precisely such points as a tenental form of that species would be supposed to differ. However, the markings of the legs and abdomen are exactly the reverse of what would be expected if this were an external form of *V. isabellina*; i. e., they are darker and more extensive. I am inclined to think, with Mr. Townsend, that there are here two distinct though closely related species.

Pyritus, nov. gen. [*πυρίτης*, a precious stone].

Large black, thickly pilose species, without lighter markings. Marginal cell open, anterior cross vein in middle of discal cell, third vein

straight. Antennæ short, third joint very broad; arista basal pilose. Eyes long pilose, widely contiguous in the male. Femora and coxæ simple, without spines or tubercles. Face very broad, the diverging eye margins form an angle of at least 80 degrees; the apex is just above the antennæ, swollen. (In *Sericomyia* and *Arctophila* the eye margins are almost parallel.)

Type of genus, *Pyritis montigena*, n. sp., North America.

This genus falls naturally into Williston's tribe Sericomyni, which contains the genera *Sericomyia* and *Arctophila*. From both of these it may be easily separated by the peculiar formation of the face and the pilose eyes. There is one genus in the Volucellini, *Phalacromyia*, which has the marginal cell open. From this it differs in having the outline of the face rounded and not produced conically downward, and also in having the third antennal joint circular and not elongate. The distinctive character of this genus, however, is the remarkably wide and swollen face.

20. *Pyritis montigena*, n. sp. Plate V., Fig. 1, a, b.

Male.—Black opaque, thickly pilose. Eyes long, dense black pilose. Face and front shining, sparsely clothed with yellowish pile, intermixed with black. Front very distinctly sulcate. Face swollen, perpendicular to below the eye margins, thence receding and very slightly concave to the oral margin. Antennæ black, third joint reddish, broader than long; arista long, loose pilose on the upper side, much less so below. Thorax long, dense, whitish-yellow pilose, the margins and three narrow indistinct central lines shining. Scutellum shining, dull testaceous. Abdomen covered with long, erect, dark yellow pile; first and second segments opaque; third with a shining band on the anterior margin, becoming more opaque towards the middle, where it is broadly interrupted; fourth segment entirely shining, except a subopaque band widely interrupted in the middle. Legs entirely black; long yellowish pilose intermixed with black on the anterior pair. Posterior pair somewhat arcuate. Wings subhyaline, with black clouds on the cross veins, and at the furcation of the second and third veins. Third vein perfectly straight. L., 12 mm.

One specimen: Moscow, Idaho; coll. Prof. J. M. Aldrich.

21. *Eristalis Meigenii*, Wiedemann, *Ausseurop-Zweiflg.*—Ins., ii., 177, 35, tab. x. b., f., 15 (1830); Williston, *Proc. Am. Phil. Soc.*, xx., 322 (1882); *ibid* Syn. N. A. Syrphidæ, p. 165 (1886); *ibid* Trans. Am. Ent. Soc., xiii., 318 (1886); F. Lynch-Arribalzaga, *Anales, d. l., Soc. Cien. Argentina*, xxxiv., p. 38 (1892).

Eristalis foveifrons, Thomson. — *Eugenies Resa*, Dipt. 419, 78 (1878); Williston, *Trans. Am. Ent. Soc.*, xiii., 318 (1886).

Eristalis Androclus, Osten Sacken. — *Western Dipt.* 337 (1877); non-Walker, *List*, 612 (1849); *ibid Cat. N. A. Dipt.*, note 223, p. 249 (1878); Williston, *Synopsis N. A. Syrphidæ*, 167 (1886).

Eristalis Brousi, Williston. — *Proc. Am. Phil. Soc.*, xx., 319 (1882): (Brousi), *ibid Synopsis N. A. Syrphidæ*, 165 (1886); Snow, *Kans. Uni. Quart. Vol. i.*, p. 38 (1892); *ibid idem.*, Vol. iii., p. 243 (1895); Townsend, *Trans. Am. Ent. Soc.*, xxii., 48 (1895); Hunter, *CAN. ENT.*, XXVIII, p. 98 (1896).

This species was described by Wiedmann in 1830 from specimens from Montevideo in South America. Thirty-eight years later Thomson, in his work on the *Diptera* of the *Eugenies Resa*, redescribed it under the name of *Eristalis foveifrons*, basing his description on specimens from Buenos Ayres.

For some time previous to 1877 Osten Sacken and Loew had been sending out specimens of a species which they identified, however not certainly, as the *E. Androclus* of Walker's *List*, iii., 612, to their correspondents under that name. Osten Sacken has a note in his *Western Diptera* (1877) concerning this species which he still at that time considered as Walker's species, *E. Androclus*. Between this time and the time of the publication of Osten Sacken's catalogue in 1878, he had examined the type of Walker's species in the collection of the British Museum and found that it was a *Helophilus*. However, he retained the name *E. Androclus*, O. S., (non-Walker) to avoid confusion.

Now, strangely enough, Dr. Williston, in *Proc. Am. Phil. Soc.*, xx., 319 (1882), recognized the male of this species as *E. Meigenii*, but at the same time described the female as *E. Brousi* (sic). In the synopsis this was corrected and the name *Brousi* given to replace *Androclus*. It was only the immense difference in localities that prevented Dr. Williston's identification of this species with *E. Meigenii*, as he states that the full description applies almost perfectly. He is now of the opinion that they are the same, and it is at his suggestion that the investigation which has resulted in the above arrangement of the names was undertaken.

22. *Eristalis occidentalis*, Will.

Five males and three females from Cook's Inlet, Alaska; coll. Prof. Dyche. Some of the males agree quite well with the description, except that the basal joints of the middle tarsi are not yellowish, which was an

error in the description, and there is no yellow posterior margin on the second and third abdominal segments. The pile of the median segments may be yellow, or mixed with black, or chiefly black. In the female the third and fourth segments are covered with dense deep black pile, and there is no posterior opaque margin on the third or else a very narrow one. This species has elsewhere been recorded only from the State of Washington. [Williston.]

23. *Eristalis montanus*, Will.

Several specimens of this species were taken during July on the Pine Ridge in North-western Nebraska. They all have the black on the second abdominal segment as broad on the posterior margin as on the anterior: some of them have an indication of an opaque cross band on the posterior part of the third, and in others the posterior part is entirely shining. The pile of the eyes is entire.

These specimens were captured hovering over a small, shallow pond, at an elevation of a trifle over 4,000 feet.

24. *Helophilus latitarsis*, n. sp.

Male.—Antennæ black: arista yellowish at the base. A spot directly above the antennæ, a broad facial stripe ending abruptly before the base of the antennæ; cheeks and narrow oral margin shining black, the facial stripe may be more brownish. Front, except the vertex which is opaque black and black pilose, and face densely yellowish pollinose and yellow pilose. Face in profile not at all conically produced below, gently concave below the antennæ to half way to the epistoma, thence perpendicular to the notched epistoma. Lower border of cheeks forms with the plane of the occiput only a very little more than a right angle. Dorsum of the thorax opaque black, everywhere short yellow pilose, complete lateral margins yellow, two median moderately broad uninterrupted silvery white stripes which reach the scutellum. Scutellum entirely testaceous pile black, on the very narrow posterior and anterior margins yellow. Abdomen, first segment opaque black, the extreme angles yellow. Second segment opaque with a very narrow posterior margin shining, bright yellow with a broad central stripe of deep opaque black not reaching posterior border and expanded on the anterior border so as to cover three-fourths of the width of the segment; posterior band ferruginous, very narrow at the lateral angles and increasing in width to the centre of the segment, where it unites with the central stripe; pile short, yellow except on the posterior margin. Third segment yellow, tinged with red-

dish posteriorly, where there is a complete narrow reddish cross-band, pilose as in the preceding segment, the black markings consist of a triangular spot, the base of which extends two-thirds of the width of the segment behind, the sides of which are concave and the apex of which is expanded unto a small elliptical spot extending less than one-third of the width of the segment, touching the anterior margin. Fourth segment with the lateral margins narrowly and the posterior margins more widely yellow, for the rest black with a broad subinterrupted pollinose band, leaving a narrow anterior band and a posterior triangle shining black, pile of posterior third black. Femora black, apical third of anterior and middle pairs yellow, an obscure reddish spot near the apex of the posterior pair; anterior tibiae yellow on basal half, intermediate entirely and posterior with only an apical band. All the tarsi except the intermediate metatarsi black; the anterior tarsi, especially the metatarsi, are very evidently widened and swollen. The posterior femora slightly thickened, their tibiae slightly arcuate, unarmed. Wings cinereous hyaline. Length, 11 mm.

One specimen: Minnesota.

This species belongs to the *groenlandicus* group. It is easily separable from *glacialis* and *borealis* by the only gently concave face. From *groenlandicus* it differs: (1) The median dorsal stripes are not very narrow, but broad, distinct, and reach the scutellum, the lateral thoracic stripes are not obsolete posteriorly; (2) the femora are more extensively yellow at the apex; (3) the pile of the thorax is everywhere yellow. From *H. Dychei*, Will., it differs in the less robust and less pilose body throughout, in the outline of the face, which in that species is obtusely conically produced and which is perpendicular below the middle in this species, in the fact that the facial stripe ends abruptly before the base of the antennae; the median dorsal stripes are wider and reach the scutellum, the scutellum is largely black pilose (in *Dychei* the pile of the scutellum is entirely yellow), the apical femoral bands are wider, and there is a much greater extent of yellow on the third and fourth abdominal segments.

Mr. W. A. Snow has a note concerning a specimen of a species of *Helophilus* of the *groenlandicus* group (Kansas Univ. Quart. iii., 243) which in some respects differs from *groenlandicus* precisely as this species does. From the short note given by Mr. Snow I am not certain that his specimen belongs to a species distinct from mine. In his specimen the pile of the dorsum is entirely yellow, the median stripes reach the

scutellum, and the middle femora are yellow at the apex. In all of these characters it agrees with mine. On the other hand, his specimen has the dorsal stripes narrow, and the lower border of the cheeks forms with the plane of the occiput an obtuse angle. In these characters it differs from mine. A comparison of specimens is necessary to clear up the difficulty.

I have noticed in the anterior metatarsus of this species a formation that I think is of considerable value as a specific character, and which apparently has not been observed in any other species of the genus. In this species it is widened and swollen considerably more than in any of the species of *Helophilus* with which I am acquainted. My autoptic knowledge of the species of this genus includes almost all of the species except those of the *groenlandicus* group, and of that group I know only *H. Dychei*, Will. Since that species has the tarsi somewhat wider than the other species of the genus, and since the authors have paid no attention to the tarsi, I am not certain but that in the *groenlandicus* group this character is not of much value. I am certain of this, however, that the swollen anterior metatarsi of the male of this species will separate it from any member of the genus outside of the *groenlandicus* group.

25. *Helophilus Dychei*, Williston, Ms.

Male.—Face below the antennæ only lightly concave : on the lower half nearly vertical and straight in profile ; the lower line of the head forms with the plane of the occiput an obtuse angle ; face on the sides yellowish-white, the median stripe black ; cheeks black. Antennæ black. Front on the lower part yellowish-white with yellowish pile ; on the upper constricted part more brownish and with longer blackish pile. Mesonotum opaque black, with two slender, yellowish or yellowish-white stripes, sometimes narrowly interrupted at the suture and reaching only about half way from the suture to the scutellum, pile abundant, dusky yellow. Scutellum light yellow with yellow pile. Abdomen black, the second segment with two large yellow triangular spots, extending the whole width of the segment ; third segment with the anterior angles yellow, the black of the second segment is opaque or subopaque with the narrow hind margin metallic ; that of the third segment is opaque on the anterior half or a little more ; third segment wholly shining, no whitish lunulate spots ; pile erect, yellowish. Legs black, the immediate tips of the femora and the base of the tibiæ yellow. Hind femora moderately dilated ; hind tibiæ arcuate. Wings cinereous hyaline ; sixth vein sinuous. Length, 1-2 $\frac{1}{2}$ mm.

The female scarcely differs. There is an indication of a gray lateral stripe on the mesonotum at the humeri. The species is closely related to *H. groenlandicus*, Stæger, but differs in the extent of the shining colour of the abdomen, the absence of the pollinose spots on the abdomen, and the colour of the pile of the mesonotum and abdomen in part. There are no yellow markings whatever on the fourth abdominal segment.

Four specimens : Sitka, Alaska ; Prof. L. L. Dyche

The above description is Williston's. The manuscript containing it was most generously turned over to me by Dr. Williston, with the permission to change it in any manner I might see fit. I have not found any change or addition to be necessary.

26. *Helophilus mexicanus*, Mcq.

I have a specimen of this species from Custer in the centre of the black hills in South Dakota. The description applies exactly. This species has not previously been recorded except in Mexico and on the Pacific Coast.

27. *Helophilus pilosus*, n. sp.

Female. — Pile everywhere, including the face, long and rather abundant. Antennæ reddish-yellow. Front opaque black, clothed with yellow pollen on the lower half or more, everywhere black pilose. Face entirely yellow, rather deeply concave below the antennæ, thence almost perpendicular, produced downwards so as to form a short, regular, sharply-pointed cone. Cheeks black, their lower border forming with the plane of the occiput a very obtuse angle. Dorsum of the thorax opaque black, with four broad, complete yellowish-white stripes, the central black interval without whitish line ; pile short yellow. Scutellum yellow, with a blackish cast ; apical margin more yellowish, pile yellow. Abdomen a trifle broader than the thorax, the sides almost parallel, pile everywhere yellow, short except on the margins of the second segment. First segment whitish pollinose, a rather large spot on each side yellow. Second segment opaque, the posterior margin shining black, on each side with an L-shaped spot of yellow extending three-fourths of the width of the segment, their inner side concave ; these spots leave a very broad interval of black between them. Third segment with a broader posterior margin of shining, with two small arcuate spots beginning at the anterior angles, not approaching each other, of yellowish pollinose. Fourth segment shining on the apical half, with two similar but almost straight spots separated at their inner ends by only as much as their width. Fifth

segment entirely shining. Legs yellow ; anterior and middle femora with a wide black stripe, attenuated on the apical part on upper side, reaching into the apical third of the femora. Posterior femora with a very broad median band and a very small apical spot black. All the tibiae yellow, the posterior pair more brownish, especially at the base and apex. Tarsi yellowish, the posterior pair somewhat brownish. Wings hyaline. Length, 9 mm.

One specimen · British Columbia.

This species differs from *H. hamatus*, Loew, in the broad abdomen, although it agrees rather closely with the description of that species in coloration. From *H. divisus*, Loew, it differs in having the face not broadly truncate on the lower portion, but sharply conical ; in the absence of black markings on the apical portion of the anterior tibiae, the absence of a light stripe in the median dorsal black one, and very greatly in the maculation of the abdomen. From *H. integer*, Loew, it differs in not having complete abdominal bands, in the darker femora and the absence of the facial stripe ; and from *H. obsoletus*, Loew, in the distinct markings of the thorax and the darker legs.

28. *Helophilus latifrons*, Loew.

Several specimens : Cook's Inlet., Alaska ; coll. L. L. Dyche.

29. *Helophilus divisus*, Loew, Centur. N. A. Dipt., iv., 78.

I have a male and a female specimen of this species which were taken in coitu. They bear no locality label. Another male bears the label "Westville, N. J." The males differ in the following respects from the females in the maculation of the abdomen. Second segment yellow except an opaque black anterior band not reaching the lateral margins by its own width, about one fifth of the length of the segment a similar posterior band narrowed at the ends but reaching the lateral margins, and a broad median longitudinal band connecting the two, the posterior margin yellow with a small pollinose spot in the middle. Second segment yellow with the black markings similar but less extensive, the anterior band only a third of the width of the segment, the posterior one with the sides slightly arcuate, the interior corners of the yellow spots and a large median posterior spot between the arcuate bands pollinose. Fourth segment entirely yellow pollinose except a slender inverted Y-shaped mark, the base of which touches the anterior margin of the segment, and the broadly divaricate segment entirely pollinose.

There is in the male near the base of the posterior femora below an obtuse tubercle covered with very short black bristle-like hairs. In this character this species shows a relationship with *H. chrysostomus*, Wied, of this country, and a stronger relationship with *H. frutetorum*, Fabr., and *H. versicolor*, Fabr., of Europe.

30. *Helophilus integer*, Loew; Centur. iv., 78.

I have a female specimen of this species taken at Newark, New Jersey. I would make the following additions to Loew's rather short description:

Face and cheeks yellow, front black pilose, below yellow and above black pollinose. The middle, as well as the anterior and posterior femora, have small black spots on the inside at the base. These spots consist of a dense mass of minute spinous bristles. The black colour at the base of the scutellum is visible only when viewed from in front, as is the case in the related species of the genus.

31. *Helophilus aureopilis*, Townsend, Trans. Am. Ent. Soc., xxii., p. 51 (1895), is the same as *H. letus*, Loew, Centur., iv., 77 (1863).

I am unable to see any differences between the description given by Mr. Townsend and Williston's description (Synopsis N. A. Syrphidæ, 189) of *H. letus*, Loew. I have also examined the type of *H. aureopilis* in the collection of the Kansas State University, and compared it with specimens of *H. letus* from New York and Colorado and find not the slightest differences between them. Mr. Townsend describes his species as "*H.*, n. sp., aff. *flavifacies*, Bigot." *Helophilus flavifacies*, Bigot, Ann. Soc. Ent. Fr., 1883, 344, must certainly be a distinct species that will be very likely recognized in time. It differs especially in the coloration of the posterior legs, which are described by Bigot thus: "*Avec trois anneaux bruns, l'un, sis à l'extrémité des cuisses les deux autres sur les tibias,*" thus lacking the broad conspicuous black median band on the femora. Besides this the bases of the anterior and middle femora are presumably at least yellow in Bigot's species since he does not mention that they are black, and there seems to be a difference in the maculation of the abdomen.

32. *Pterallastes perfidiosus*, n. sp. Plate V., Fig. 5, a, b.

Front and cheeks black, the former with long erect black pile, intermixed below with yellow. Face yellow, pilose, slightly concave to tip of the inconspicuous tubercle, thence straight and slightly receding to the epistoma, which is truncate at the apex. Antennæ and arista yellow, third

joint a trifle broader than long. Thorax opaque black, with narrow yellow lateral borders, rather short, sparse, yellowish pilose. Scutellum translucent yellow, with an apparent black in some lights. Abdomen shaped like that of *P. thoracicus*, but a little more elongate, short yellow pilose, first segment black, somewhat shining; second opaque black, except a complete posterior cross band, and with elongate lateral yellow triangles, which reach from the anterior angle to just before the posterior shining band, and the inner angle of which extends towards the middle of the segment about a fourth of its width; third segment shining, except a large, square, opaque spot with deep indentations on the sides, situated on the anterior part of the segment; fourth segment with a similar much smaller spot. All the femora black on the basal half, the anterior pair more extensively so; tibiae yellow, the posterior pair more or less tinged with brown at the base and apex, posterior tarsi black. Posterior femora considerably thickened with short spinose bristles below, the femora arcuate. Wings hyaline, third vein very deeply bent, marginal cell wide open, last section of the fourth vein straighter than in *P. thoracicus*, anterior cross vein in the middle of the discal cell. L., 10 mm.

Described from two female specimens bearing the label "British Columbia."

The very great differences between this species and the only other described species of the genus *P. thoracicus* has caused me no little trouble in ascertaining its generic position. The extreme looseness of the definition of the genera of the Syrphidæ makes it impossible in many cases to locate a given species in its proper genus, except by a process of finding where better than elsewhere it may be placed. The present is by a great deal the best illustration of this fact that I have so far discovered. Its location in the Eristalini is without any doubt whatever. But as between *Triodonta*, *Teuchocnemis*, *Mallota* and *Pterallastes*, it seems to fit into one about as well as into another. Of these we may more easily throw out of consideration *Mallota*, on account of the formation of the face and general great pilosity, although the venation is precisely as in that genus. We may next dispose of *Teuchocnemis*, in which the third vein is only moderately bent, although we are here approaching differences that are only of specific value. As between *Pterallastes* and *Triodonta*, as far as the female sex is concerned, I know of no distinction sufficient to be called generic. In the male sex there are, however, good and sufficient grounds for generic separation. What has led me to place this species in

Pterallastes rather than in *Triodonta* is simply the general habitus. I think that too much importance has been placed on the presence of pollen on the thorax as a generic character.

33. *Criorhina verbosa*, (Harris) Walker. List iii., 568.

I have one male specimen bearing the label "St. Anthony Park, Minn." that I am quite certain must be this species. The description applies exactly except as to the median facial stripe. A thick coating of grayish pollen covers the face uniformly throughout; the cheeks, however, are shining.

34. *Pocota bomboides*, n. sp.

Black, but little shining, face black, first three abdominal segments black pilose.

Male.—Very much like *P. grandis*, but legs unarmed and much smaller. Antennæ and arista reddish-yellow, the basal joints brownish. Face black, indistinctly white pollinose, a broad stripe and the cheeks shining. Dorsum of the thorax long yellow pilose before the base of the wings, the remainder and the scutellum black pilose. Abdomen—First three segments black pilose; all except the first with indistinct posterior margins. Fourth segment more shining than the others, with a band of dense long yellow pile occupying the anterior half, the remainder of the segment black pilose. Legs simple, without spines or tubercles, black pilose; all the femora black except the extreme apex, on the posterior femora the apex is more broadly reddish; anterior tibiæ on the basal half, middle except an indistinct broad band, posterior entirely dark reddish brown, tarsi all reddish, two apical joints black. Wing strongly tinged with reddish, forming a large spot extending from the stigma to the base of the second posterior cell. L. corp., 12 ½ mm.; al., 11 ½ mm.

One specimen: Summit Sierra Nevada, California.

This species must resemble *P. apiformis* of Europe even more than *P. grandis*, Will., does. It differs from that species in not having yellow pile on the third abdominal segment and in the face being entirely black. It is very striking in general appearance as a miniature of *P. grandis*, Will. It is, however, easily separable from that species by the unarmed femora, coloured wings and black face.

The above is a manuscript name by Dr. Williston which I found attached to the specimen in the collection of the Kansas State University. The manuscript containing it had been misplaced. I thus continue the name although the description is my own.

35. *Brachypalpus inarmatus*, n. sp.

Very similar to *Brachypalpus frontosus*, Loew, but differs in the fact that the coxæ, femora and tibiæ of the male are entirely unarmed.

Male.—Antennæ dark reddish-brown, third joint slightly darker on the lower basal corner; first joint shining; arista yellow, its apex fuscous. Face front and cheeks bluish-black, somewhat shining, covered, except a broad oblique stripe on cheeks, with silvery pollen, more dense on the front, which in some lights obscures the ground colour. Occiput below with long yellowish pile. Face in profile concave, but the concavity not receding nearly as low as the lower border of the eyes nor as far back as the eye margin. Dorsum of thorax light shining green with four cupreous stripes, the median ones more slender and all abbreviated behind the middle; the pile yellow and rather abundant. The scutellum and an irregular, poorly defined area in front of it on the dorsum cupreous. Abdomen shining purplish-black, with yellow pile longer on the sides of the second segment and on the posterior margin of the fourth, where it forms a conspicuous fringe. In the middle of the second segment there is a small, slender, opaque spot not reaching the posterior margin. Legs black; femora long golden pilose, the extreme apex of the femora, the narrow base of the tibiæ, and the tarsi, except the last two joints, black. Posterior femora and coxæ without spurs or protuberances, the former moderately incrassate. Wings distinctly infuscated on the anterior half.

One male specimen: Vollmer, Idaho, May 30th, 1896; Prof. J. M. Aldrich.

There are differences between this species and *frontosus* in the face, which is uniformly pollinose, but bare and shining below the antennæ in that species, in the presence of a golden fringe on the posterior margin of the fourth abdominal segment, in the pile everywhere being golden and not gray as in that species, the posterior femora are less curved and the tibiæ are darker than in my specimens of *frontosus*.

It has occurred to me that this might be simply a dimorphic form of *B. frontosus*, holding the same relation to that species as the form *Bautias* holds to *Mallota cimbiciformis*, Fall. From the differences enumerated above, however, it does not appear that such can be the case.

36. *Xylota barbata*, Loew.

A single male specimen [Santa Cruz Mountains, California, 18th April] agrees so well with the description of this species that I am constrained to think it is this species, although it lacks the posterior coxal

sptrrs. It has occurred to me that possibly where Dr. Williston, in the Synopsis, p. 234, says "hind coxæ unarmed," he meant to state exactly the reverse. The second and third abdominal segments are opaque, but have obscure yellowish, shining spots: the fourth segment is entirely shining bluish-black. The thoracic dorsum and scutellum are brilliant purplish-metallic.

37. *Xylota analis*, Will. Synopsis N. A. Syrphidae, 226.

I possess a male specimen of this species taken on the Pine Ridge in Nebraska in July. This specimen agrees exactly with a specimen from San Pedro, California, Aug. 1896. This species has not been recorded outside of New Mexico and California.

38. *Xylota fraudulosa*, Loew. Centur. v., 41.

I have specimens of this species taken in North-western Nebraska.

39. *Xylota ejuncida*, Say.

One specimen: Cook's Inlet, Alaska; coll. L. L. Dyche.

40. *Mallota facialis*, Hunter.

This species was described from a single male specimen from Pine Ridge, Nebraska. This season's collecting includes another specimen from the same region that is in every way a verification of the views I held at that time.

41. *Triodonta*, sp.

I have a female specimen of a species of this genus from Palo Alto, California, which undoubtedly is a species distinct from *curvipes*, Wied. It is, however, so closely allied to that species that I hesitate to describe it from only the female. Doubtless in the male there are abundantly sufficient characters for specific separation. This specimen differs from the female of *T. curvipes*, Wied., in having the thorax almost bare and shining, not densely brownish pollinose. The abdomen is bare and shining black with the narrow posterior margins of the segments yellow, with only very slight indications of pollinose spots on the segments laterally. It is also much smaller, 8 mm. in length.

42. *Tropidia montana*, Hunter; Ent. News, 1896, p. 215. (Change of name from *T. nigricornis*, which is preoccupied. See Ent. News, 1896, 305.)

Since writing the description of this species I have examined a female specimen of *Tropidia incana*, Townsend (Trans. Am. Ent. Soc., 1895, p. 53), from Colorado, as well as the type of that species in the

collection of the Kansas State University. From this examination I am enabled to give further differences between these two species which are very closely allied.

The face in *incana* in the female is distinctly more concave than in *montana*. In *incana* the face recedes from the apex of the antennal callosity to half way to the epistoma ; from that point the outline of the face projects outwardly at the same angle that the upper half recedes inwardly. In *montana* the outline of the face on the upper half is exactly the same as in *incana*, but on the lower half the outline is an almost perpendicular line. Besides this the front is somewhat narrower in *incana*, the spots of the abdomen are much larger and the pile is considerably shorter.

43. *Tropidia mamillata*, Loew, Centur. i, 68, 1861.

Four male specimens of this species were taken by the writer at Cedar Bluffs, Nebraska, in April, on flowers of *Prunus virginicus*. This is, I believe, the only record of the capture of this species since the publication of Loew's first Century in 1861. The locality given in that case was Illinois.

LIBELLULA DEPLANATA OF RAMBUR.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.

In December, 1896, Mr. Adolph Hempel sent me from Orange Co., Fla., some full-grown dragonfly nymphs which were apparently not to be referred to any of our known genera. At my request he undertook to breed some of them, and soon had imagoes of the species named above. In the letter which accompanied his bred specimens he recorded some careful observations, which are so interesting and valuable I deem them worthy of permanent record. The following account of the habits of this species is from Mr. Hempel's letter :

This species frequents small ponds and the borders of adjacent woods. Imagoes fly, when undisturbed, quite leisurely. They will hover over one spot, then dart a few feet aside and hover again and again. The males are often found in low places about ponds, resting on the ground with wings aslant downward and forward. Sometimes they rest on reeds or snags in the water ; sometimes out in the pine woods several hundred yards from water ; they may be found resting on the sand warmed by the sun, on logs or on trees.

The female deposits her eggs while hovering over the water, descending to dip the tip of her abdomen repeatedly. She is generally interrupted in her peaceful occupation and soon driven away by the too importunate males. The females remain for the most part in the woods and come from the woods to the ponds to oviposit, but hardly has one shown herself over open water before several males are in pursuit and she quickly disappears again. The difference in the haunts of the sexes is so marked that males would seem largely in excess to one who collected only beside the water, females so to one who collected only in the woods.

The nymphs are quite active. When in the water they rest with the long abdominal appendages widely spread apart; but withdrawn from the water, these are brought together so that the abdomen seems to end in a long point. When picked up they have a habit of curving the abdomen as if to strike with the terminal spines. Their transformation takes place in the early part of the forenoon, and imagoes leave their empty old skins generally clinging to stumps and logs fallen in the water.

The full-grown nymph measures 23 mm.; abdomen, 16; hind femur, 5.5; width of abdomen, 6; of head, 4.5. Body slender, not depressed; abdomen smooth; thorax and legs clothed with tawny hairs.

Colour fulvous, yellowish beneath and on sutures; eyes black; sides of thorax indistinctly marked with black; apical third of abdomen reddish, with two broad black lateral stripes.

Head wider than long; eyes not remarkably prominent; vertex roundly elevated. Rear of head straight or very slightly concave.

Labium moderate; mentum without raptorial setae; median lobe prominent; its border crenulate, with single spinules between the crenulations. Lateral lobes ample; movable hook nearly straight to the short, abruptly incurved tip; raptorial setae 6 each side; teeth of opposed margins crenate, each ending in a sharp, incurved hook, and armed with a stout spinule.

Meso-thoracic stigmata separated by less than the width of one of them. Wing-cases reaching well upon the 6th abdominal segment.

Abdomen lance-oval, with sharp lateral margins. Long, straight, sharp, lateral spines on 8 and 9. Dorsal hooks on 4 to 8, the first erect spine like the others directed backwards, the hindmost with their dorsal margin forming a straight line to the base of the segment; 9th abdominal segment hardly longer on ventral than on dorsal side; 10th segment a little shorter than 9th, conical. Abdominal appendages very long (13 mm.) and sharp, longer than segments 9 + 10; superior and inferior appendages equal; laterals one fourth as long.

Libellula deplanata, Rambur, is but a smaller southern variety of *Libellula exusta*, Say, as was pointed out by Mr. P. P. Calvert in 1893 (Trans. Amer. Ent. Soc., XX., 258). But in recent repeated dismemberment of the genus *Libellula* no part of it has been left to bear that name

in America. As genera go the European *Libellula depressa* of Linnæus is certainly worthy to stand alone, and by all the recognized codes it has the right to the original generic name. So that our N. American species belong to *Leptetrum*, Newman; *Plathemis*, Hagen; *Belonia*, Kirby, or *Holotania*, Kirby; and Kirby (1890 a Synonymic Catalogue of Neur. Odon., London) has distributed our species rather freely among all these genera. I now have nymphs of species referred by him to all the genera, and, unfortunately, they do not confirm his arrangement of the imagoes. The unknown nymphs still in the majority would doubtless lend the best aid to drawing the lines where they belong.

As implied at the outset, the nymphs described above differ by good generic characters from all others known to me. They differ from all Libellulid nymphs which I have seen by the entire absence of raptorial setæ from the mentum of the labium. They are distinct from the nymphs representing the four genera named above by several additional characters: by hooked teeth on opposing edges of the lateral labial lobes; by the extreme elongation of the abdominal appendages and especially by the shape and relations of the 9th abdominal segment which is not longer on the ventral than on the dorsal side, and consequently does not at all appear to enclose the 10th segment. The following characters of venation taken together appear to clearly segregate the imago: (1) The sectors of the arculus are not stalked in either wing. (2) The sub-triangular space consists of three areoles. (3) A short sector, which may be called the *apical sector*, arising beneath the stigma from the principal sector and extending to the apex in both wings, in this species arises under the proximal fourth of the stigma. This *apical sector* develops from a tracheal branch, is very constant in position, and may readily be recognized even when somewhat irregular if taken in connection with another which may be called the *sub-apical sector* which (in Libellulidæ) lies just posterior to it, parallel with it, and separated from it, except at the proximal end, by a single row of areolets. Hagen, describing *Libellula deplanata*, Rambur, in 1861 (Syn. Neur. N. Amer., p. 154), questioned whether it belonged to the genus. The nymph supplies an emphatic negative, which the venation and doubtless other adult characters corroborate, and which is equally applicable to the more recent subdivision of the genus. I therefore propose a new genus *Ladona* with *L. exusta*, Say (= *L. deplanata*, Ramb.), for its type. And for this interesting and locally common species, which ranges from Florida and Maine to the Columbian River basin, because of its very distinctive white humeral stripes, I would suggest the common name, "the Corporal."

NAKED AND COCOON PUPÆ OF ANTS.

BY GEO. B. KING, LAWRENCE, MASS.

Ordinarily the tribe Camponotidæ can be separated from the other tribes of ants by its habit of having cocoon pupæ in which their young go through their transformation period; whereas those of the (so-called) aculeate genera remain naked and do not spin a cocoon, it will appear, however, if diligent search be made, that several species of this tribe (Camponotidæ) do have naked pupæ, mixed with their cocooned ones, Latreille seems to have been the first to discover that *Formica fusca*, L., had naked and cocoon pupæ. He could not, however, understand why this should be, and indeed it remains one of the dark mysteries of the present day. So far as I am aware no other species of ants have been listed, other than *Formica fusca*, L., having this habit. During my researches in the study of the ants of Massachusetts, I have found that other species have acquired the same habit. And to satisfy myself that no mistake was made on my part in the determination of the larva, cocoon or imago, I sent samples of them to my friend and co-worker, Mr. Ernest Andra, of France, for his opinion, and at the same time enquired of him if any of the ants of Europe had been discovered with naked and cocooned pupæ, other than *F. fusca*. In his reply he stated that *F. fusca* is very frequently found with these two forms, and occasionally *Formica sanguinea*, Latr.; *Lasius niger*, L.; *Lasius fuliginosus*, Latr., and *Polyergus rufescens*, Latr., have been found in Europe having naked and cocooned pupæ, the last four species being very rarely met with in this condition. The species having this habit thus far found by me in Massachusetts are:

Formica fusca, L., var. *subsericea*, Say. ; June 8.

“ “ “ sub. sp. *subpolita*, Mayr. ; June 20.

“ *lasioides*, Em., var. *picea*, Em ; July 31.

This list may be extended after further research; they are, however, not very frequently met with. The season of the year in which they are to be found being hot and dry, and the ants much more active at this time, as their usual custom is, they will hasten off with their young very rapidly to the underground retreats of their nests, making it quite difficult to obtain samples of either. Furthermore, I might possibly have found more with similar habits if this were the only work which I am investigating, but as I am studying all the insects living with ants, it is quite possible that in many instances their cocoons and pupæ are overlooked.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXIV. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(*Continued.*)

MOLORCHUS, Fabr.

Easily recognized by the very short elytra which are divaricate and separately rounded at apex, about equalling the prothorax in length. *M. bimaculatus*, Say (fig. 23), is somewhat variable in colour, but is ordinarily black except a large testaceous blotch on each elytron. The thorax is rather broad, roughly punctured, the sides irregularly rounded, length, .20-.32 in. Usually found on flowers, but has been bred from hickory, maple, ash, and dogwood.

CALLIMOXYs, Kraatz.

Distinguished from *Molorchus* by the shape of the elytra, which are longer and drawn out nearly to a point at tip. The sexes differ in colour, the males usually having a partially red thorax. *C. sanguinicollis*, Oliv., is blackish (except as stated above), punctured, the elytra more or less fuscous with clear punctuation. Anterior and middle legs entirely blackish, the posterior yellow except the tips of the joints, which are black. The hind tibiæ are long and curved in the males, the exterior margin with numerous teeth. Length, .33-.40 inch. Found on flowers in June and July.

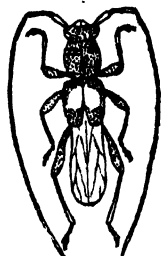


FIG. 23.

ANCYLOCERA, Serv.

It may be that the Canadian record for *A. bicolor*, Oliv., is incorrect, since the species is said to be a resident of the Southern States from North Carolina to Texas. It is unknown to me in nature, but is said by Mr. Leng to be "a very dainty insect, black with scarlet elytra and abdomen and with slender legs and clubbed thighs. The body is slender, head short and prothorax very long as compared with the cylindrical elytra. The antennæ are serrate, one-half as long as the body in the female and longer than the same in the male. The hind pair of thighs is armed with a terminal spine." Length, .50-.70 inch.

BATYLE, Thoms.

B. ignicollis, Say, is from .28-.52 in. long, black, the prothorax bright red. The elytra are densely rugosely punctured, with blackish pubescence. The prothorax is rounded, unarmed, the pubescence longer than on the elytra. *B. suturalis* is smaller (.28-.36 in.), red, the legs

more or less black, the elytra often with a black line along the suture which may be dilated behind so as to extend over the greater part of the apical third. The prothorax is said to be occasionally black, but such specimens have never come under my notice. These beetles are often abundant on flowers on the Western plains of the United States.

PURPURICENUS, Serv.

Contains one species, *P. humeralis*, Fabr., a large insect, .50-.74 in. long, black, except a large triangular humeral spot on each elytron. Sides of prothorax spinose. Entire upper surface coarsely punctured, rugosely on the thorax, the elytral punctures distinctly and rather widely separated.

STENOSPHEENUS, Hald.

Here belongs *S. notatus*, Oliv., a rather elongate beetle of nearly parallel form, the elytra slightly tapering behind. In colour it is black, the head beneath and the entire prothorax except a large central dorsal black spot, reddish. The punctuation is rather coarse but sparse and each puncture gives rise to a gray hair, those of the elytra being subseriate in arrangement. The antennæ are spinose, equalling or exceeding the length of the body. Length, .35-.48 inch. Adults of this species have been cut from hickory wood.

CYLLENE, Newm.

The two Canadian species of this genus are difficult to separate since they agree almost exactly in colour. The numerous cross-bands of yellowish (or rarely grayish) pubescence on the velvety black prothorax and elytra give them a very characteristic appearance. Dr. Horn has distinguished them as follows:—

Second joint of hind tarsi glabrous at middle, antennæ of male longer than the body. .42-.89 in. *pictus*, Drury.

Second joint of hind tarsi densely pubescent, antennæ not longer than the body. Prosternum as wide as the coxal cavity. .40-.80 in. *robinia*, Forst.

The species differ in their times of emergence, *pictus* often appearing on its principal food-plant (hickory) early in spring, or even in winter if firewood of this sort be stored in a warm room. I have on one occasion seen several specimens copulating and ovipositing on felled honey-locust early in April at Iowa City. It also bores in butternut. *C. robinia* infests living black locust, often ruining the trees. It appears in late summer or early fall and may be found in great numbers on blossoms of golden-rod,

PLAGIONOTUS, Muls.

The soft-maple borer, *P. speciosus*, Say (fig. 24), is a most gaudy insect of large size (about an inch in length) and with heavier antennæ than most of its neighbors. The ground colour is black or nearly so, the legs reddish; but owing to the dense clothing of yellow pubescence very little of the black is visible. Almost the entire under surface is thus rendered yellow, as are also the legs, the greater part of the head, two short bands on each side of the prothorax, and several cross-bands on the elytra.

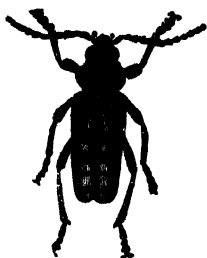


FIG. 24.

CALLOIDES, Lec.

Includes another large insect, *C. nobilis*, Harr., black, pubescent, usually decorated on the elytra with a few small detached yellow spots, which may, however, be absent. Length, .80-.92 in. It is thought to breed in the chestnut.

ARHOPALUS, Serv.

A. fulminans is said to breed in oak, butternut and chestnut. It is .48 to .72 inch long, black with whitish pubescence forming irregularly defined bands on the elytra and leaving on the prothorax a large central black spot with a smaller one on each side. The thoracic marking alone will thus serve as a ready means of recognition.

XYLOTRECHUS, Chevr.

Includes several species which have the front of the head variably carinate; they are, for the most part, ornamented with transverse bands of lighter coloured pubescence, somewhat as in *Cyllene*.

A. Prothorax with four spots of (usually yellow) pubescence. Elytral markings indistinct and not conspicuous. .32-.48

in.....*quadrimaculatus*, Hald.

AA. Prothorax not spotted (except by breaking up of bands), sometimes fasciate with pubescence.

b. Elytra obliquely truncate at apex, the outer angle spiniform. Sides of prothorax regularly arcuate. .60-.72

in.....*sagittatus*, Germ.

bb. Elytra obliquely truncate at apex, but not spiniform.

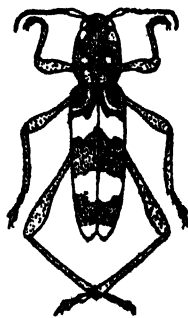


FIG. 25.

- Thorax without apical and basal pubescent band.
 Elytral bands about as broad as their intervals.
 .32-.64 inch. (Fig. 25.) *colonus*, Fabr.
- Thorax with apical and basal pubescent band. Median
 elytral bands angulated or undulatory. .44-.84
 inch. *undulatus*, Say.

The above table is, in the main, taken from Mr. Leng's synopsis. He adds, regarding *undulatus*, that there may, for convenience in cabinet arrangement, "two names be retained: *fuscus*, Kirby, for the form with the sides of the thorax entirely covered with pubescent blotches and the elytral bands wavy, and *interruptus*, Lap. & Gory, for the form with the bands greatly obscured by the sprinkling of white hair." As to food-plants, *colonus* is known at attack oak and maple, while *undulatus* has been beaten from spruce. The latter is often very abundant on freshly cut pine logs or sawed timber.

PLAGITHMYSUS, Motsch.

This name is substituted for the *Neoclytus* of the Check List. The prothorax is transversely rugose, and by this character the genus may be readily distinguished from other Canadian Clytini. Mr. Leng separates the species substantially as follows:—

A. Middle and hind femora spinose at apex.

- b. Thorax with a longitudinal elevated ridge, rugose at apex, antennæ filiform. Thorax with basal and apical bands only of pubescence; colour reddish brown, posterior two-thirds of elytra and parts of thorax often darker. .28-.76 in. *luscus*, Fabr.

- bb. Thorax with a few distinct transverse rugæ, antennæ thickened toward apex. Blackish; head, thorax and legs reddish, elytra with straight transverse bands of yellow pubescence. .20-.70 in. *erythrocephalus*, Fabr.

AA. Femora not spinose, antennæ filiform, thorax with many strongly elevated but more or less confused transverse rugæ.

- c. Elytra rounded at apex, the bands yellow (rarely whitish), forming an oval figure at the base of each, behind which are two slightly oblique fasciæ. Tip yellow. .48-.80 in. *caprica*, Say.

cc. Elytra truncate at tip. Smaller species with long legs and whitish elytral bands.

Thorax wider than long. .28-.40 in. *muricatus*, Kirby.

Thorax longer than wide. .36-.44 in. *longipes*, Kirby.

P. erythrocephalus is known to depredate on elm, soft maple, hickory and black locust; *P. caprea* on ash, elm and hickory, while *P. muricatus* and *P. longipes* may be taken on freshly cut pine.

CLYTANTHUS, Thoms.

C. ruricola, Oliv., is black, base of femora, the tibiae, tarsi and antennae (except at tip) reddish. Pubescence yellow, forming a nearly complete thoracic margin, a scutellar spot and elytral markings as follows: A short oblique band near the base, posterior to which is a hook-like (sometimes interrupted) figure the shaft of which is nearly parallel with the suture, and behind this a rather broad, nearly straight but oblique band. Beneath, the meso- and metathorax are spotted and the apices of the abdominal segments more or less margined with the same colour. Length, .28-.48 inch.

EUDERCES, Lec.

Contains two small (Canadian) species which agree in their ant-like form, the elytra gibbous at base and with an oblique ivory fascia. The colour varies from black to almost entirely rufous, the tip of the elytra, however, remaining black in the latter case. Mr. Leng separates them by the following characters:—

Eyes nearly divided; prothorax uniformly rounded at sides. .20-.36 in. *picipes*, Fabr.

Eyes completely divided; prothorax distinctly depressed each side near the anterior margin, laterally subangulate. .26-.36 in. *pini*, Oliv.

In my experience, *E. picipes* may be taken by beating hazel bushes. When running up the side of the beating-net the resemblance to certain black species of *Formica* (which are often abundant in the same thickets) is truly striking. It has been bred from chestnut twigs.

CYRTOPHORUS, Lec.

Until recently but one species has been recognized. Captain Casey has of late described another form which he distinguishes from *verrucosus* as follows:—

Larger, pronotum compressed, prominent along the middle, basal elevation of elytra strong. Third antennal joint strongly spinose. .24-.40 in. *verrucosus*, Oliv.

Smaller, less convex, pronotum not compressed, basal elevation of elytra feeble, third antennal joint briefly spinose-dentate within at apex. .24 in. *insinuans*, Cas.

These bear considerable resemblance in form to *Eudercus*, but are without the ivory-like band of the elytra. In colour the former is blackish; legs, in part, and basal three-fifths of elytra sometimes rufous, pubescence white or cinereous, arranged anteriorly in narrow oblique bands which follow the course of the basal elytral gibbosities. Behind these oblique bands is a very narrow cinereous one, nearly transverse in direction. Tip broadly covered with cinereous pubescence. I have not seen *C. insinuans*, which is described from a single male. Wild cherry is known to be a food-plant of *C. verrucosus*.

MICROCLYTUS, Lec.

M. gazellula, Hald., is found in the adult state on oaks. The genus differs from *Cyrtophorus* in not having the third antennal joint spinose at tip.* It is "a small insect, piceous or reddish-brown with the thorax above and the elytra, except about the middle of the suture, black and rather closely punctured, the legs and antennæ always paler. Elytral markings composed of long white hairs arranged as follows: An oblique line from the scutellum, a very short transverse or slightly arcuate line about the middle entirely distinct from the next, a broader band immediately behind and nearly transverse, a blotch covering the entire apical eighth of the length of the elytra." (Leng.) In the male the antennæ equal, in the female reach two-thirds the length of the body. In the former sex the elytral tips are very slightly truncate, in the latter separately rounded.

*Since publication of the table of genera I have come across the following note by Dr. Hamilton (CAN. ENT., XXIII., p. 63):—"The characters separating *Cyrtophorus* and *Microclytus* were originally feeble, and have recently become more so by some one discovering that the relative lengths of the antennal joints in the male of the latter are the same as in the former, thus leaving in the males only the presence or absence of a small spine at the end of the third joint of the antennæ as diagnostic." By a clerical error the legend *Cerambycoidea* is placed one line too high up on p. 86 of my table; it should be on line 2, and embraces all the genera from *Chion* to *Microclytus*, inclusive.

NOTES ON RHOPALOCERA, WITH DESCRIPTIONS OF NEW SPECIES AND VARIETIES.

BY HENRY SKINNER, M. D., PHILADELPHIA, PA.

I have received beautifully fresh specimens of *Argynnis atossa* taken in the mountains near Tehachapi, Southern California, July 7th, 1895. The inner half of the superiors below is bright red, almost a blood red. The species was described by Mr. Edwards from a specimen taken by Mr. H. K. Burrison. It is quite distinct and ranks with *diana*, *idalia* and *nokomis* as one of our handsomest Argynnids.

Argynnis Snyderi, n. sp.—♂. Expands three inches. Upper side : Superiors tawny as in other species, but dark and with considerable red. The black markings are distinct and sharply defined against the tawny background. The margin is distinctly but not heavily marked. The inferiors have the usual black markings, but they are unusually well defined and there are almost no black scales at base as in most species in the genus. Under side : Superiors have silver spots on outer margin, extending more than half way toward inner margin. There are two quite large subapical silver spots. On inferiors the silver spots are large and well defined, with wing-ground very light grayish-green with a distinct light buff intermediate border about one-eighth inch in width. Silver lunules on margin are large, well defined, and seven in number, the inner one extending up along inner margin as a line. The ground colour of wings on inferiors below is brownish in the female. This large species comes nearest *coronis*, and has been mistaken for it. I have specimens from Salt Lake City, Utah, taken June 23rd, 1895, and a female from Ogden, July 6th, 1895. All were taken by Prof. A. J. Snyder, after whom the species has been named.

Argynnis platina, n. sp.—♂. Expands two and a half inches. Upper side : Rather light tawny or even light buff. Black markings dense and wide, with outer halves of wings looking rather clear or open, with row of round spots not very large ; marginal border light ; bases of wings not much obscured. Under side : Superiors have the two subapical silver spots and silver spots on margin well defined ; colour of inner half of wing rosy. Silver spots on inferiors are large and well defined and placed on a very light greenish-gray ground. The intermediate buff band is well defined, comparatively wide and very light in colour. Ground colour on inferiors below is reddish brown in the female. Described from specimens taken at Ogden, Utah, between July 18th and 24th, and Beaver Canon, Idaho, at nearly same dates. From Prof. A. J. Snyder.

The typical *Arg. nevadensis* comes from Nevada, and the types came from the valleys of the Sierra, near Virginia City. I have specimens from Reno and Verdi, Nevada. I mention this as I do not think the specimens from Colorado and Utah are typical but are var. *Meadii*, or more nearly related to that variety. I have females from Mammoth Hot Springs which are the colour of *leta* ♀. The species figured in Ent. News, pl. 2, 1892, is not *chariclea* but *polaris*. The other Greenland *Argynnis* brought back by the Peary expedition is *chariclea*, var. *artica*, Zett.

Melitaea Beani.—I propose this name for the Alpine form of *anicia* from the high elevations near Laggan, Alberta, the fauna of which has been so assiduously studied by Mr. Thos. E. Bean, and who has made known new species and interesting facts in regard to the butterflies of that region. This variety has quite a different appearance from the low valley form, being darker, smaller, and with markings apparently run together more and not nearly so bright in colour. Expanse of *Beani* $1\frac{1}{16}$ inch. Expanse of low valley form $1\frac{1}{16}$ inch. I have specimens of *Melitaea alma*, Ströcker, from Coso Valley, Cal.; May. Types came from Arizona and South Utah.

Phyciodes Barnesi, n. sp.—♂. Expands $1\frac{3}{4}$ inch. Shape and colour of *P. mylitta*. Superiors light tawny with less markings than any known species. Superiors have an eight-shaped mark in cell near base of wing; just below this is another better defined eight-shaped mark; in centre of cell is a small naught-shaped mark; below this on inner margin is a good-sized black spot; there is a black bar at end of cell and another black bar near angle of wing; the remainder of the wing is practically immaculate. Inferiors have a number of black lines extending out from base for about one-fourth inch; remainder of wing except margin is nearly immaculate, except that the markings on under side can be faintly seen. Under side: Superiors much as above. Inferiors have the markings as is usual, but are not so well defined and are quite light in colour. Specimens were taken at Glenwood Springs, Colo., May 8th to 15th, and June 1st to 7th, by Dr. Wm. Barnes, in whose collection are many co-types.

I have specimens of *Junonia cænia*, var. *negra* (Feld. Reise Nov. Lep., 3, 399, n. 592, 1867) from S. E. Texas; Coleina, Mex.; Merchantville, N. J. (Kemp).

Cænonympha (Erebia) Haydenii—♀. This differs markedly from the ♂ in being entirely different in colour. Males are dark smoky-brown, and the females are nearly same colour as *Cæn. inornata* but not so reddish. This species was found in numbers by Prof. Snyder at Beaver Canon, Idaho, last of July and first part of August, 1895.

Thecla damon, n. var. *discoidalis*.—Differs from typical form in having central area of both wings light greenish-yellow. Round Mountain, Blanco Co., Texas, February 10th and August 16th.

Pieris ochsenheimeri, Staudinger (Stett. Ent., Zeit., 1886, p. 199). This species was described by Dr. Staudinger from Central Asia, and is beautifully figured in "Memoires sur les Lepidopteres" by N. M. Romanoff, 4, 220, pl. 14, f. 1 a, b, 1890. Through the generosity of Dr. Herman Strecker, of Reading, Penna., I received two males and a female of a *Pieris* unknown to me from Mt. Wrangel, Alaska. They prove to be the above-mentioned species. As Romanoff's work may not be accessible to many, I append the following description:—

♂.—Expands 1½ inch. Upper side: Superiors white with costa blackish-gray; apical costa, apical portion of wing and upper part of outer margin blackish. There is a round black spot in the space between last costal and first discoidal nervure. Neuration shows faintly gray scales. Bars of wing black. Inferiors white with only one spot and that on outer third of costa, round, black. Base of wings black; there is a very narrow, dark, submarginal line to both superiors and inferiors. Under side: Superiors much as above except that apices of wings are yellowish, and there is an additional spot (not always well defined) below the third discoidal nervure. Inferiors have mixed yellow and gray spots as in *Pieris napi bryoniae*. The female differs from the male in having the veins rather heavily marked with dark scales, as are also the apices of superiors and bases of all four wings. It has an additional dark spot on superiors. Below the veins are not as heavily marked and the ground colour of wings is white instead of yellow.

Systasea pulverulenta, Feld.—I have received a specimen of this species from Prof. T. D. A. Cockerell, who sends the following particulars: "Caught April 22nd at Mesilla, New Mexico, on flowers of *Biscutella Wislizenii*. It is different from any Hesperid I have caught here. When I saw it I thought it was a moth near to *Drasteria*."

SOME NEW AND LITTLE-KNOWN DORYDINI (JASSINÆ).

BY C. F. BAKER, AUBURN, ALA.

Spangbergiella vulnerata, Uhler.—There are two specimens of this species in the National Museum collection from New York, and another in Fitch collection from Arkansas.

Spangbergiella Lynchii, Berg.—Signoret quotes the description of this species in his *Essai sur les Jassides* and says. "This species might well be the *S. vulneratus*." Berg takes this suggestion as the final disposition of the species, and reduces *Lynchii* to a synonym of *vulnerata*. I have a specimen of what is undoubtedly this species, from the Herbert H. Smith collection taken at Corumba. While it is very near *vulnerata*, still I think it should retain its place as a good species. It differs from *vulnerata* in having the head more slender, vertex a fourth longer than width between the eyes, the red lines not reaching the middle. In North American specimens of *vulnerata* (and so figured by Signoret) the vertex is but little if any longer than broad between the eyes, and the red lines converge considerably beyond the middle—at the tip as figured by Signoret.

Spangbergiella mexicana, n. sp.—♀. Length, 6.5 mm. Pale green, darker on vertex, pronotum, and bases of abdominal segments. Two oblique slender red lines on vertex, converging towards the tip, which they do not quite reach. Pronotum with two red lines extending its whole length, nearly in line with those on vertex, at its base with a median yellowish dash. Scutel immaculate. Elytra whitish towards the tips; claval suture and all veins except apical, yellow. A black dot at end of claval suture, and one each at end of first and fourth apical veins.

Vertex triangular, obtusely angulate anteriorly, but little longer than breadth between the eyes, about a fourth longer than pronotum. Clypeus subrectangular, broadly rounded at tip. Pronotum twice as wide as long. Ovipositor two-thirds length of rest of venter, exceeding the elytra by $\frac{1}{2}$ mm. Last ventral segment a half longer than preceding, hind margin truncate.

Described from a single female collected at Vera Cruz, Mexico, by Rev. H. Th. Heyde. This species is nearly related to *S. punctato-guttata* and *S. felix*, but is distinct from both as described above.

Bergiella, n. gen. Type, *Parabolocratus uruguayensis*, Berg.—The head is broader than long, somewhat angulate and sloping as in *Parabolocratus*. The frontal sutures are arrested at the antennal scrobes. The

clavus has but a single longitudinal vein. A specimen of this species, collected at Chapada, is in the H. H. Smith collection. I name this genus in honour of the author of "Hemiptera Argentina."

Parabolocratus flavidus, Sign.—This species, described from North America, was omitted from the Van Duzee List. There are specimens in the National Museum from Texas. I have also collected it at Auburn, Ala.

Paraphlepsius, n. gen.—Head about the same width as the prothorax and considerably shorter, three and a half times as broad as long, anteriorly foliaceous, angulate, vertex level. Face of the normal Jassid type. Frontal sutures continued to the edge of vertex. Ocelli on the edge between vertex and face, somewhat removed from the eyes. Elytra broad, slightly exceeding abdomen, bluntly rounded at tip, with a narrow appendix. Apical cells four, anteapical two, basal transverse vein entering radial cell. Clavus with two longitudinal veins. Wings with three apical cells exclusive of the closed costal.

This genus is nearest to *Psegmatus*, Fieber, from which it differs in having the head broader and much shorter than pronotum, and the frontal sutures nearly straight, instead of strongly bent inward, as in *Psegmatus*. Type :—

Paraphlepsius ramosus, n. sp.—♀ ♂. Length, 7 mm. Robust. Thickly marked with fine brownish dots and ramose lines. Face and below brown, the face marked with numerous yellowish dots. Legs yellowish, annulate with dark brown. Vertex and pronotum brownish, with numerous small, partly confluent whitish dots, which are larger on the latter. Elytra whitish translucent, with very numerous brown ramose lines adjoining the veins and in the cells; in the female a large irregular clearer space towards base; in the male this clearer space is more pronounced, and there are small clear spots in several of the cells, the ramose lines becoming darker in a broad transverse band at middle of elytra.

Genæ broadly angularly emarginate below the eyes, the succeeding angle very obtuse, beyond attaining the tip of the clypeus. Loræ large, semilunar. Clypeus trapezoidal, narrower at base, truncate at tip. Front rapidly broadening above, apex rather abruptly bent forward, sides nearly straight. Width of vertex between eyes two and a half times the length; length about two-thirds that of pronotum. Pronotum two and one-third times as wide as long, broadly rounded anteriorly, hind margin gently concave; posteriorly the surface is rather coarsely, subobsoletely creased.

Last ventral segment of female twice the length of the preceding, shallowly trisinate, the median sinus acute.

Described from two specimens from the Cornell University collection, kindly sent me by Mr. A. D. Macgillivray, collected at Ithaca, N. Y., the female on Aug. 3rd, 1889. This insect might readily be mistaken for a *Phlepsius*.

Dorydiella, n. gen.—Head broader than prothorax and somewhat longer, more than twice as broad as long, anteriorly foliaceous, angulate, and inclined upward. Face normal. Ocelli on the edge between vertex and face, adjoining the eyes. Elytra long and narrow, with a narrow appendix, somewhat exceeding abdomen, toward the apex narrowed to an acute point. Apical cells four, anteapical two, basal cross vein entering radial cell. Clavus with two longitudinal veins. Wings with three apical cells exclusive of the closed costal.

This genus is much like *Dorydium* in everything except the head, which is far shorter. Type :—

Dorydiella floridana, n. sp.—♀. Length, 8 mm. Pale sordid whitish. Face variously marked with fine light brown dots, leaving portions below, and several indistinct transverse bands above, light. Vertex and pronotum with a number of very pale brownish indistinct longitudinal stripes. Anterior edge of vertex with five dark dots. Elytra with very sparse brownish ramose lines, densest about and extending back from the second apical cell. A dark spot at apex of clavus.

Genæ feebly emarginate below the eyes, then broadly rounded, slightly exceeding clypeus. Loræ large, semilunar. Clypeus somewhat narrower towards base, sides sinuate, apex truncate. Front with sides nearly straight, rapidly broadened above where it is bent somewhat back. Length of vertex three-fourths of width between eyes, somewhat longer than pronotum. Pronotal width nearly two and a third times the length ; anteriorly the pronotum is broadly rounded, the surface very sparsely punctate and posteriorly finely creased, the hind margin gently concave. Last ventral segment but little longer than preceding, hind margin with a broad, blunt, median projection having a small notch at its extremity and a black dot on either side.

Described from a single specimen in the National Museum collection, labelled "Fla." It is to be hoped that collectors doing miscellaneous sweeping in Florida will look particularly for further specimens of this rare and interesting insect.

CORRESPONDENCE.

BROTIS VULNERARIA AGAIN.

One of the many fine things secured by Mr. Bice at electric light during the season of 1896 was a specimen of that perplexing aberrant Lepidopteron, *Brotis vulneraria*, Hub.

In the CANADIAN ENTOMOLOGIST for 1886, Vol. XVIII., page 72, Mr. Ph. Fischer reports the capture of a specimen in Buffalo at electric light and gives some description of it and an account of the difficulty experienced by the various authors to decide its position in systematic classification. At page 136 the Rev. G. D. Hulst comments on that report and gives further information upon the subject, and quotes Walker as saying that "it does not seem to fit well anywhere."

Mr. Fischer identified his specimen by Hubner's figure. I had no difficulty in recognizing the London specimen by Guenée's illustration of it in his *Lepidopteres Phalenites*, plate 22, fig. 9, under the generic name *Sphacelodes*, but was indebted to Dr. J. B. Smith for a clue to its location in his List of 1891. I had forgotten these notices, where Dr. Hulst gives its generic synonymy, and the cause of it, although I read them with interest mingled with curiosity at the time, knowing nothing whatever of the moth referred to.

It is an interestingly anomalous insect. Whether in a tropical collection it has fitting associates with which it may harmonize and bear a resemblance, it certainly stands out conspicuously distinct in the Ontario one to which Mr. Bice has kindly donated it. J. ALSTON MOFFAT.

PODISUS PLACIDUS.

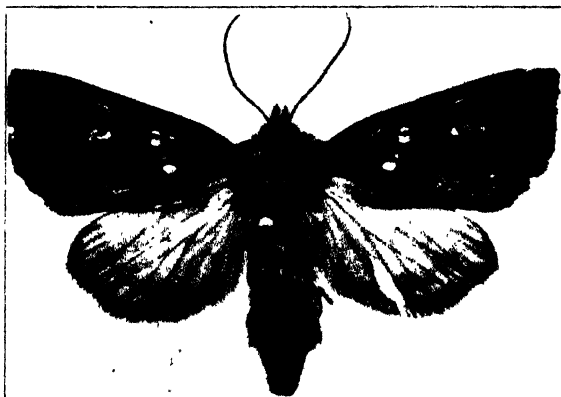
In the May number of this journal Mr. Kirkland, of the Gypsy Moth Committee, publishes the descriptions of two Pentatomids by Mr. Uhler—*Podisus placidus* and *Euschistus politus*. Of *Podisus placidus* he says he was unable to find the original description, nor could Prof. Uhler at the time give him the reference. This description may be found in the American Entomologist, Vol. II., page 203. E. P. VAN DUZEE.

Buffalo, N. Y.

• ERRATUM.—On page 101, seventh line from bottom, for DORYLIDÆ read MYRMICIDÆ.

Mailed June 4th, 1897.





THE COLUMBINE BORER, *HYDROECIA*
PURPURIFASCIA, G. & R.

The Canadian Entomologist.

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THE COLUMBINE BORER (*HYDROECIA PURPURASCIA*, G. & R.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In 1894, Mrs. J. J. Glessner, Littleton, N. H., called my attention to a "worm" which was feeding in the roots and stems of her columbines. It was not until July, 1895, however, that she succeeded in getting specimens of the "worm" for me. The "worm" proved to be a caterpillar which was unfamiliar to me, and in accordance with my usual practice in such cases, it was described and photographed. The photographs, giving dorsal and lateral views of the caterpillar, twice natural size, are reproduced on the plate.

The full-grown larva measured one and three-eighths inches in length. Its general colour is mars brown, much lighter on the venter of the first two thoracic and last four or five abdominal segments. The head is of a light russet colour, black about the eye-spots. Mandibles dark brown, black-tipped. Thoracic shield concolorous with the head on the dorsum, but merging into black on the sides and sometimes into a narrow black cephalic border: the shield is divided by a narrow whitish mesial line. Anal shield large, black, merging into brown mesially. The true legs are brownish-black, and the bases of the pro-legs are marked with blackish areas. Short light brown hairs arise from conspicuous, comparatively large blackish spots; the piliferous spots on the dorsum of the last two abdominal segments are considerably larger than the others. The spiracles are black. There is a continuous narrow white mesial stripe extending along the dorsum. A similar white stripe extends along the subdorsum on each side, but it is not continuous, being entirely obsolete on the first four abdominal segments, and sometimes on the last thoracic segment also. The discontinuance of these two white side stripes gives the larva a rather curious appearance, as the figures show.

One of the caterpillars, which was received in the latter part of July, 1895, pupated on or about August 8, and the adult insect (the beautiful moth shown twice natural size on the plate) emerged September 3, 1895.

The moth proved to be the one described by Grote and Robinson in 1868 as *purpurifascia*. Imagine the light spots in the figure to be of a delicate creamy white colour, the other shades as various shades of orange, purple, and russet brown, and you will have a faint conception of the rather uncommon but beautiful combination of colours presented on the wings of this insect.

I can find no reference in the literature to the early stages or habits of this insect. On account of its destructive work in Mrs. Glessner's columbines, it may be appropriately called "the Columbine borer." The moth has been recorded as occurring in Maine and Massachusetts in September and October, and in New York in August; it is also known to occur in Illinois and Colorado. Mrs. Glessner writes that she has found that rich soil, cultivation, and Fowler's solution of arsenic (diluted one-half with water) poured around affected plants seemed to check and control the pest.

THE RASPBERRY-CANE MAGGOT (*PHORBIA RUBIVORA*, COQUILLETT).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

This new raspberry pest has been discussed in detail in Bulletin 126, issued in February, 1897, from the Cornell Agricultural Experiment Station. The life-history and habits of this Anthomyiid are fully illustrated in the Bulletin. At the time the Bulletin was written, however, the name of the insect had not been determined. In April, 1897, I reared several more of the flies and sent some to Mr. D. W. Coquillett at Washington. He soon reported that the insect was a new species of *Phorbia*, and sent me the following technical description of the fly, which he had drawn up from the specimens I sent him.

Phorbia rubivora, Coquillett, n. sp.—♂. Ground colour black; sides of front and of face white pollinose, eyes sub-contiguous, more approximated to each other than are the two posterior ocelli, frontal vitta at the narrowest part linear; third antennal joint less than twice as long as broad, slightly over twice as long as the second, arista thickened on the basal third, the penultimate joint slightly longer than broad. Thorax grayish pollinose, marked with three black vittæ; three postsutural and three sterno-pleural macrochætæ. Abdomen quite thickly covered with suberect bristly hairs; narrow, subcylindrical, greenish-gray pollinose,

marked with a black dorsal vitta ; tip of abdomen greatly swollen, bearing a subconical process in front of the hypopygium. Front and middle tibiae each bearing two bristles on the posterior and one on the outer side below the middle besides those at the tip, hind tibiae each bearing a single bristle on the inner side near the lowest third, three on the front side and two on the outer side, in addition to those at the tip ; under side of each hind femur bearing a row of bristles, those at the base the shortest. Wings hyaline, tinged with gray at the base and less distinctly so in the marginal cell, costa strongly arcuate along the costal cell, costal spine shorter than the small cross vein, the latter beyond the middle of the discal cell, hind cross vein nearly straight and subperpendicular, last sections of the third and fourth veins distinctly diverging ; calypteres whitish, halteres yellow, the extreme base of the peduncle brown.

♀. Front three-fourths as wide as either eye, frontal vitta destitute of a pair of macrochaetae, sides of front yellowish-gray pollinose ; abdomen ovate, pointed at the apex, almost bare, destitute of a black dorsal vitta ; costal spine slightly longer than the small cross vein ; otherwise as in the male.

Length, 4 to 5.5 mm. Two males and two females, bred by Mr. M. V. Slingerland, from larvae boring in the stems of the cultivated raspberry at Ithaca, N. Y.

The male will be easily recognized by the narrow abdomen and the arrangement of the bristles on the legs ; the female, by the absence of the usual pair of macrochaetae on the upper part of the frontal vitta.

D. W. COQUILLET.

Mr. R. H. Meade, of England, sends me the following report upon some of the flies which were sent to him at the same time : "I have examined the flies carefully, and they seem to be an undescribed species of *Phorbia*. I cannot identify them with any European species that I know, and I think you may describe them as new. You might call them *P. rubi* or *P. ruborum*."

I shall be glad to send a copy of Bulletin 126 to anyone who may be further interested in this raspberry-cane maggot.

The annual meeting of the Association of Economic Entomologists will be held at Detroit, Mich., on Thursday and Friday, August 12th and 13th.

PRELIMINARY STUDIES OF N. AMERICAN GOMPHINÆ.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.

Examples of the emphasized importance of larval life better than that furnished by the subfamily Gomphinae of Odonata are few even among insects. The nymphs live under the sediment (mostly organic debris) which falls to the bottom of ponds and streams. They are aquatic burrowers which live at such slight depth that their anal respiratory orifice is never beyond the reach of clean water. This thin stratum, which forms their home and which they only leave to transform, is one of great biologic richness. In it they have found room for development in enormous numbers and necessity for extreme specialization. They are, at least when well-grown, among the more powerful members of its teeming hidden population. The imagoes emerge, flit about under cover for a few days, lay their eggs and die. They emerge largely by daylight and are subject to great decimation of numbers at this time, and are sought later by numerous powerful enemies. The females which live to oviposit lay a very large number of eggs. A female of *Gomphus fraternus* laid for me in a watch glass of water over 5,000 at one time. The imagoes of the ancient genus *Gomphus* are regarded as a race of weaklings. Their nymphs, on the contrary, are splendidly equipped for the battle of life. And it is to the perfection of their adaptation that the prevalence of Gomphines with us is due.

These conditions have developed a large and very uniform series of imagoes, with one colour pattern, one plan of venation, one *habitus*, consisting of many very closely related species difficult to study. Specific characters, though slight, are yet constant. The slight specific variations of an ancient colour pattern long retained are unusually reliable. Secondary sexual characters reach here their maximum of importance and of specific individuality. This is as one would expect, recalling the vicissitudes of adult life and that its chief concern is with reproduction.

The real competition of life, however, is carried on by the nymphs, and the outcome of it is that they have become specialized. They have developed along several lines and have become segregated into well-marked natural groups which are not so obvious among the imagoes.

De Selys separated from the great genus *Gomphus** as he found it three genera represented in our fauna, *Ophiogomphus*, *Herpetogomphus* and *Dromogomphus*, and divided the remainder into groups of species. My breedings of the nymphs during the past three seasons in the main confirm these groups and show that three of them at least are worthy to rank as genera.

One of the genuine surprises of this season was the finding here, at Ithaca, of nymphs like those described by Hagen from Rocky Creek, Ky.. (Trans. Amer. Ent. Soc., XII., 281, 1885) and doubtfully referred by him to *Tachaptryx Thoreyi*, and the rearing from them of *Gomphus parvulus*, Selys. "This extraordinary nymph combines head and antennæ of *Hagenius* with legs and abdomen of *Gomphus*," wrote Hagen in the beginning of his very careful description. The length of the wing pads showed the nymphs not to be young, as Hagen supposed, and made it impossible to consider them as belonging to *Tachaptryx*, but that they should yield this dainty little Gomphine was still a surprise.

In June and July, 1896, I bred *Gomphus fraternus*, Say, in numbers at Havana, Ill. The nymphs are exactly described by Hagen (loc. cit., p. 262) as No. 13, *G. adelphus* (supposition). In May, 1895, I bred *Gomphus graslinellus*, Walsh, at Galesburg, Ill. These, especially the former, are very near to the typical *G. vulgatissimus* of Europe.

**Nomenclatural.* In the case of *Aeshna* vs. *Gomphus*, I have examined the evidence and find it is as follows: Linne included all dragonflies known to him in one genus, *Libellula*. Fabricius (1775. Syst. Ent., pp. 420-426) divided the genus into three, *Libellula*, L., *Aeshna*, Fabr., and *Agriion*, Fabr., placing under *Aeshna*, among other species, *L. grandis*, L., and *L. forcipata*, L. It is worthy of note that he left *L. vulgatissima*, L., in *Libellula*. Illiger (1802. *Magazin für Insektenkunde*, p. 126) corrected the spelling to *Aeschna*, merely to accord with its etymology. Latreille was the first to designate types. He specifies (1802. Hist. Nat. Gust. Ms. III., 286) *L. depressa*, L., as the type of *Libellula*; *L. vulgatissima*, L., as the type of *Aeshna*, and *L. virgo* as the type of *Agriion*. With regard to the second, which alone concerns us here, *L. vulgatissima*, L., was described and figured by Latreille under the name "*Aeshna forcipata*, Fabr.," as was shown later by both Hagen and De Selys. Kirby's Catalogue of Neuroptera Odonata (1890) gives the correct synonymy and thus contains in itself the evidence which condemns the substitution it proposes. For if the type named by Latreille for *Aeshna* was *vulgatissima*, L., this species having been excluded by Fabricius when he founded the genus, cannot be its type. Leach (1815. Edinburgh Encycl. VIII. part 2, p. 726, of Amer. reprint) founded the genus *Gomphus*, with *L. vulgatissima*, L., for its type and placed under *Aeshna*, Fabr., the sole species *L. grandis*, L. However, Cuvier had previously (1798) characterized *Aeshna* (as pointed out by De Selys, C. R. Ent. Soc. Belg., 1890, p. CLXI.) and described under it the sole species *grandis*, L. This usage has since been universally followed until 1890, and one is glad to find there is now no reason for change.

I follow De Selys in using the name *Ophiogomphus*, Sel., which seems to have been quite properly given.

In the *pallidus* group I find another type of nymph very distinct in the two species I have reared (*pallidus*, Ramb., at Galesburg, Ill., May 1895; *villossipes*, Sel., Ithaca, N. Y., May 1897).

The *plagiatus* and *notatus* groups of De Selys together present another type of nymph, already pointed out by Hagen (loc. cit., p. 269) as perhaps of more than subgeneric value. The bred nymphs of this group are of *plagiatus*, Sel., *notatus*, Ramb., *spiniceps*, Walsh, and *segregans*, n. sp. (vid. sub finem.)

Believing that the immature stages throw much light on the relationship of the imagoes, and that the study of this large and homogeneous group will be facilitated by the setting apart of distinguishable sub-groups, I propose three new genera which need here have no further characterization than that of the following tables: *Lanthus* (λανθανη contracted), type *G. parvulus*, Selys, *Orcus* (nomen proprium), type *pallidus*, Ramb., and *Stylurus* (στυλος and οὔρε), type *plagiatus*, Selys. With these apart *Gomphus* is still somewhat polymorphic. The *dilatatus* group, characterized by extreme dilatation of the apex of the abdomen in the imago and correspondingly greater width to the 9th abdominal segment in the nymph, may yet, with advantage, be set apart. A clear line of demarcation, however, is not yet apparent.

I now hazard a table for separating these subdivisions of the *Legion Gomphus*, Selys. It is to be regarded as preliminary and tentative, the more so as I have endeavored to base it on characters common to both sexes. This legion is distinguished from others of Gomphinæ by the absence (normally) of cross veins from all the triangles and supra-triangular spaces.

TABLE FOR IMAGOE OF THE LEGION GOMPHUS, SELYS.

1. Outer side of triangle of fore wing distinctly angulated at the origin of the cross vein between the two upper discoidal areolets.....2.
- Outer side of triangle of fore wing straight or nearly so.....3.
2. Inferior abdominal appendages of ♂ recurved upward in their apical half; vulvar lamina of ♀ shorter than half the 9th abdominal segment*Herpetogomphus*, Selys.
- Inferior abdominal appendages of ♂ recurved upward only at their extreme apices; vulvar lamina of ♀ almost equalling the 9th segment.....*Ophiogomphus*, Selys.

3. Upper sector of the arculus arising from its upper end, *i. e.*, the part of the arculus above the sectors shorter than the part below them..... *Lanthus*, gen. nov.

Upper sector of arculus arising from its middle; *i. e.*, the part of the arculus above the sectors longer than the part below them..... 4.

4. Hind femora with 5 to 7 long spines intermixed with smaller ones..... *Dromogomphus*, Selys.

Hind femora with numerous shorter spines..... 5.

5. Ninth abdominal segment a little longer than 8th. Segments 7, 8 and 9 very little enlarged... .. 6

Ninth abdominal segment not longer, generally shorter, than the 8th; segments 7-9 more or less enlarged .. *Gomphus*, Leach.

6. Dorsum of thorax pale with darker stripes; 8th abdominal segment cut obliquely at apex, longer on the dorsum than at the sides. abdominal appendages of ♀ hardly longer than the 10th segment..... *Orcus*, gen. nov.

Dorsum of thorax dark with paler stripes; 8th abdominal segment not longer on the dorsum than at the sides; abdominal appendages of the ♀ at least one half longer than the 10th segment..... *Stylurus*, gen. nov.

Nymphs of four of our N. American Gomphine genera remain to be discovered. *Tachaptryx* and *Dromogomphus* of the eastern U. S., *Gomphoides* of Texas and *Octogomphus* of California. I venture now a preliminary table for our known nymphs. Doubtless many modifications of it will be necessary as the unknown nymphs still largely in the majority are discovered

TABLE FOR GOMPHINE NYMPHS

1. Wing-cases strongly divergent..... *2.
Wing-cases laid parallel along the back 4.

*This will not apply to gaping *exuviae* in which originally parallel wing-cases have been forced apart

2. One third or more of the length of the abdomen, formed by the 10th abdominal segment(supposition). *Aphylla*.
Tenth abdominal segments not longer than the other segments...3.
3. Middle legs less distant at base than fore legs.....*Progomphus*.
Middle legs not less distant at base than fore legs.....(These apparently not separable) *Herpetogomphus* and *Ophiogomphus*.
4. Third joint of antennæ flat, circular5.
Third joint of antennæ cylindric, at least twice as long as wide...6.
5. Abdomen flat, subcircular*Hagenius*.
Abdomen ovate, twice as long as wide*Lanthus*.
6. Abdominal appendages longer than the 10th segment, front border of median lobe of labium straight (or in *Gomphus* occasionally very slightly rounded), with the usual fringe of flat scales, but without teeth. Abdomen not abruptly narrowed before 9th segment.....7.
Abdominal appendages shorter than the 10th segment; front border of median labial lobe produced into a prominent rounded lobe which is generally armed with a conic apical tooth. Abdomen rather abruptly narrowed to the base of its 9th segment, more slowly tapering to the apex*Orcus*.
Body spindle-shaped, little flattened; fore and middle tibiæ with small external apical hooks or with none*Stylurus*.
- Ninth abdominal segment one half longer than the 8th, its lateral margins nearly parallel. A minute middorsal apical spine on the 9th segment only. Lateral lobe of the labium with a strongly incurved end hook and teeth on the inner margin increasing in size posteriorly.
Body flat, lanceolate; fore and middle tibiæ with strong external apical burrowing hooks. Ninth abdominal segment hardly longer than the 8th, much narrowed posteriorly. Rudimentary dorsal hooks on some of the segments before the 9th.*Gomphus*.

(To be continued.)

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXV. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(*Continued.*)

ATIMIA, Hald.

Represented by *A. confusa*, Say, the only Canadian species of the group Atimioides. Aside from the structural peculiarities given in the table of genera, it may be characterized by the blackish colour and the punctate surface clothed with rather long yellowish pubescence, which is irregularly disposed so as to leave abraded smooth spots. The elytra are broader than prothorax, truncate at tip. Length, .33-.40 inch.

NECYDALIS, Linn.

This genus, by the short elytra, bears some resemblance to *Molorchus*. The third and fourth antennal joints together are distinctly longer than the fifth. Our species is *N. mellitus*, Say, unknown to me, but described by Mr. Leng as being of variable colour, "usually rufo-testaceous, head, antennæ (base and tip tinged with rufous), thorax, scutellum and abdomen above black; elytra punctate, more coarsely toward the margin; reddish-brown, with paler spot at tip or entirely rufo-testaceous." The elytra are marked by an oblique impression which is not deep and does not reach the tip. Length, .60-.84 inch.

DESMOCERUS, Serv.

D. palliatus, Forst., is found on the elder (*Sambucus*) in July. It is a very showy beetle, with narrow head, deeply impressed above, bell-shaped prothorax, and faintly costate elytra. Colour blue except the base of the elytra, which is broadly orange or yellow. Length, .70-.90 inch. This insect can be mistaken for no other Longhorn.

TOXOTUS, Serv.

"This genus is sharply defined by the spurs of the hind tibiæ, which are inserted at the base of a deep excavation instead of at the extreme end."—(Leng.) This character is of easy verification, and is in itself sufficient for the separation of *Toxotus* from other Lepturoides. A modification of Mr. Leng's table may be used for the Canadian forms.

A. Elytra striped, black with marginal and discal yellowish vitta. .60-.68 in *trivittatus*, Say.

AA. Elytra unicolorous or nearly so.

- b. Third joint of antennæ much longer than the fourth.

Larger species, legs bicoloured. .76-1.00 in. . . *Schaumii*, Lec.

Smaller species, legs unicoloured. .40-.60 in. . . *vestitus*, Hald.

- bb. Third joint of antennæ but slightly longer than the fourth.

Tips of elytra obliquely truncate, sub-bidentate. .87-.90

in. *cylicollis*, Say.

The name *trivittatus* replaces that of *vittiger* in accordance with the synonymy proposed by Mr. Leng.

RHAGIUM, Fabr.

R. lineatum, Oliv., is often common under pine bark or in lumber piles. It has scarcely the appearance of being a Longhorn at all, the antennæ being so short as to usually fail of attaining the base of the elytra. The prothorax is much narrower than the elytra, armed on each side with a strong spine or acute tubercle. The elytra are narrowed behind, sharply costate. In colour the insect is black or nearly so, the prothorax appearing gray from the pubescence which clothes it, excepting a smooth stripe on each side (including the spine) and one on the median line. The elytra are marked by a few reddish or yellowish spots, and the pubescence is irregular, giving a mottled appearance. Length, .54-.80 inch. My small specimens are from the Lake Superior region, while the large ones came from the forests of the mountains of Arizona.

-CENTRODERA, Lec.

A large species, *decolorata*, Harr. (Fig. 26), is our only representative. The head, prothorax, under surface and appendages are reddish-brown, the elytra lighter. The eyes are more prominent than usual, the prothorax shining, nearly smooth at middle, closely punctate and somewhat opaque at sides, lateral tubercle large and acute. Elytral punctuation coarse at base, becoming finer to tip, sides nearly parallel. Mr. Leng describes the antennæ as "about as long as the body," but they may fall one-third or more shorter. Length, 1.20 to 1.25 inch. Rather rare. Found on beech by Mr. Harrington.



FIG. 26.

PACHYTA, Serv.

- A. Elytra reticulate with raised smooth lines, the intermediate spaces coarsely punctured. Black, subæneous, antennæ, femora and base of tibiæ ferruginous. .51-.64 in. *rugipennis*, Newm.

AA. Elytra simply punctured.

Punctuation finer, surface of elytra finely pubescent, opaque or nearly so. Black, legs and antennæ often reddish, elytra yellow, four spots on each and tip black. .35-.38 in. *monticola*, Rand.

Punctuation coarse, surface of elytra glabrous, shining, colour black, elytra sometimes testaceous, or more or less distinctly maculate with black. .60-.72 in. *liturata*, Kirby.

I am unacquainted with *P. rugipennis*, and the description is taken from Mr. Leng's synopsis. *P. monticola* is to be found on blossoms of wild rose, while I have taken *liturata* in numbers on piles of sawed pine lumber.

ANTHOPHILAX, Lec.

Three Canadian species are recorded, only one of which, *A. attenuatus*, Hald., is known to me. The others, *A. viridis*, Lec., and *A. malachitus*, Hald., are suspected by Dr. Horn to be respectively the ♀ and ♂ of one species. Following his table they separate thus: all belonging to that section of the genus in which the antennæ are slender, the third joint much longer than the fourth.

"Elytra coarsely punctate scabrous, more or less metallic.

Elytra greenish-blue, legs black. .70 in. *viridis*, ♀.

Elytra cupreo-æneous to blue, legs pale. .52 in. . . . *malachitus*, ♂.

Elytra testaceous, irregularly maculate with piceous spots. Surface coarsely sparsely punctate and with small spaces which are distinctly pubescent; median line of thorax distinctly impressed. .56 in. *attenuatus*."

Mr. W. H. Harrington has taken the last mentioned insect at Ottawa on beech.

ACMÆOPS, Lec.

Only two species, *pratensis* and *proteus*, are recorded in the Society's lists and additions. I have, however, seen *bivittata* with the label "Quebec," and recently Mr. Chagnon sent a specimen of *subpilosa* as coming from Montreal; *longicornis* is known from the far north of Canada, and is included in the subjoined table, which is in the main equivalent to those prepared by Dr. Leconte and Mr. Leng.

A. Front and mouth much prolonged, body moderately robust, prothorax bell-shaped, sides sinuate but not tuberculate. Black, elytra variable, either blackish, reddish or clouded, occasionally indistinctly vittate. .24-.34 in. *pratensis*, Laich.

AA. Front not greatly prolonged.

b. Body short and stout, antennæ thicker, hind tarsi stout, the joints 1-3 equally pubescent beneath. Prothoracic tubercle distinct, elytra closely punctured. Colour varying from entirely black to almost entirely testaceous; or the thorax may be yellowish while the elytra are black. Typical form has yellowish elytra, each with two black stripes. .24-.36 in. *bivittata*, Say.

bb. Body more slender, antennæ more delicate, hind tarsi slender, pubescence wholly or in part lacking beneath on second and sometimes on first joint.

c. Disk of prothorax convex, slightly channeled, densely punctured.

Prothorax longer than wide, elytra rather sparsely punctured, pubescence short and scant. Colour extremely variable, black to testaceous; elytra often vittate. .36-.44 in. *longicornis*, Kby.

Prothorax broader than long; blackish, pubescence very long. .36-.44 in. *subpilosa*, Lec.

cc. Disk of prothorax flattened behind and prolonged into two dorso-lateral tubercles. Colour variable, blackish to testaceous, legs variable, but apparently with the base of the femora at least always rufous. .24-

.36 in. *proteus*, Kirby.

While definite information is lacking, it is probable that *A. proteus* and *A. pratensis* breed in pine, since they are so frequently found on piles of pine lumber. *A. bivittata* (Fig. 27) is to be collected on flowers of *Anemone pennsylvanica*. Mr. Leng calls the punctuation "sparse," but it is rather close and coarse.

GAUROTUS, Lec.

G. cyanipennis, Say, is readily known by its brilliant colour. The body is black, shining often with a purplish tinge, the elytra bright green, polished, the antennæ, legs and mouth-parts yellowish. The head is distinctly but sparsely punctured, the prothorax almost smooth except at sides, the elytral punctuation very distinct but widely separated. Length, .36-.40 in.

In Wisconsin I found this insect almost confined to Sumac blossoms. It is said to have been found ovipositing on butternut,

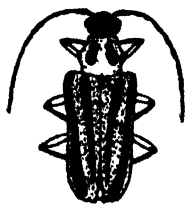


FIG. 27.

ENCYCLOPS, Newm.

E. cæruleus, Say, belongs here. It is smaller than most of the Lepturoides, and of slender parallel form, the elytra scarcely tapering to tip. The head is broad, squarish, the constriction far behind the eyes. Lateral thoracic tubercle distinct. Colour usually blue, varying to greenish, legs testaceous, antennæ with the bases of the joints (especially the distal ones) more or less testaceous. Punctuation strong, rugose. .28-.32. inch

FOOD PLANTS OF THE SAN JOSE SCALE (*ASPIDIOIUS PER-
NICIOSUS*) IN OHIO, EXCLUSIVE OF FRUIT TREES.

BY F. M. WEBSTER, WOOSTER, OHIO.

The following list includes forest and ornamental trees and shrubs, upon which the San José scale has been found breeding in Ohio*. Nearly all of these have been found either by myself or my assistant, Mr. C. W. Mally, in sufficient numbers to indicate that the insect might thrive on any of them. The Cotoneaster was sent for inspection, it having been recently received from a Long Island nursery firm, and when received was literally covered with the scale.

Grape, <i>Vitis labrusca</i> .	Willow (imported), <i>Salix veriminalis</i> .
Linden, <i>Tilia Americana</i> .	Cut-leaved Birch, <i>Betula</i> , sp.
European Linden, <i>Tilia Europea</i> .	Lombardy Poplar, <i>Populus dilatata</i> .
Sumac, <i>Rhus glabra</i> .	Carolina Poplar, <i>P. monilifera</i> .
Japan Quince, <i>Pyrus japonica</i> .	Golden-leaf Poplar, <i>P. Van Geerti</i> .
Cotoneaster, <i>C. frigidum</i> .	Catalpa, <i>C. speciosa</i> .
Flowering Peach, <i>Prunus</i> , sp.	Chestnut, <i>Castanea sativa</i> .
Flowering Cherry, <i>Prunus</i> , sp.	Osage Orange, <i>Maclura aurantiaca</i> .
American Elm, <i>Ulmus Americana</i> .	Snowball, <i>Viburnum opulus</i> .
Black Walnut, <i>Juglans nigra</i> .	

To these must be added the several varieties of roses, currants, gooseberries and raspberries. The Early Richmond cherry I believe to be exempt from attack, as I have found trees whose branches interlocked with those of a pear that had been killed by the scale, yet the cherry was uninfested; and in two cases that came under my observation, where this variety of cherry had been grafted upon mahaleb stock, and shoots had sprung up from below the graft, the shoots were badly infested with scale, while none at all could be found on the trees themselves.

*The determinations have been kindly verified by Dr. L. O. Howard, of the Division of Entomology, Department of Agriculture, Washington, and his assistants.

THE HIND WINGS OF THE DAY BUTTERFLIES.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

I wish to offer here a few remarks on the structure of the hind wings of the diurnals especially, in extension of my recent paper on the Butterflies of Hildesheim.*

The first point relates to the fact that the hind wings are more specialized as compared with the primaries. The probable explanation I offer is, that the hind wings bear more of the weight of the body (abdomen), and that they regulate the downward stroke of the fore wings. A parallel suggests itself with the vertebrates in which the hind legs are more specialized; and the cause is then, in both cases, a mechanical one. This specialization in the hind wings of the day butterflies manifests itself primarily in the inequality of the wings, of which the secondaries have the Radius 1 branched, the primaries 3 to 5 branched. In the second place by an advance over the front wings in the process of the absorption of the median veins, so that the radius or cubitus of the secondaries draws the branches nearer to itself than the corresponding vein of the primaries. Vein IV₂, in the case where its condition is not permanently generalized (*Lycaenidae*, *Riodinidae*, *Hesperiidae*), is thus usually more drawn out of its original central position on the secondaries; it submits also first to degeneration (*Hesperiidae*) on the hind wings, showing that here the cross vein has degenerated for a longer period than in the primaries, isolating the vein and depriving it of nourishment over a longer ancestral line. The cross vein itself vanishes first on the secondaries. Here the cell may be open, all trace of the scar vanished (*Araschina*, *Melitaea*), while on the fore wings the degenerate vein is present, closing the cell.

The progress in the evolution of the neuration is evidently taking place in identical directions on both wings. The generalized condition of the radius (it being 5-veined) of the primaries in *Papilio* gives way to a specialized condition (4-veined) in *Parnassius*, with an intermediate 5-veined state in *Thais*, in which latter the upper branch of the median series, vein IV₁, which has left the cross vein to emerge from the radius in *Parnassius*, leaves the cross vein near the upper angle of the cell.

The absorption of the veins is everywhere attended by the same indications of a physiological process which, in its external manifestations, it is easy to trace. It is the same with veins II. and III. of the hind

*Mittheilungen a. d. Roemer Museum, No. 8, Feb., 1897.

wings. The greater the extent of absorption of II. by III. (the radius), from the base of the secondaries outwardly, the more specialized is the form. In the *Limenitini* (*Nymphalinae*) the absorption is carried forward to the point of issue of the rudiment of I., so that the subfamily *Nymphalinae* may apparently be separated from the *Argynniae* by this character. While I have in various places in my paper correctly stated the change in the position of II. and III., owing to this basal fusion of the two veins, I have in others written of a withdrawal of I. towards the point of junction of II. and III., which, in fact, is the reverse of what takes place, although the effect seems the same. I. probably remains constant, or nearly so; in the cases where it is reduced to a mere scar it seems still to occupy the same relative position on vein II. It is extinguished by absorption. At the same time the fusion of II. and III. constantly changes in extent. In low forms, such as *Leptidia*, the two veins seem wholly separate at the base of the wing. In *Argynnis*, which is the lowest Nymphalid I have examined, the fusion at base is very limited, whereas in the highest Nymphalids the fusion is carried up to the point of issuance of I. In the Pierids the fusion is generally limited, and here, as I have pointed out in my essay, they lag behind the Nymphalids. The extent of the absorption is everywhere the measure of the specialization.

The last point to which I would here draw attention is the junction of the cross vein on hind wings with IV₃, or rather V₁. Here the Pierids have again lagged behind, the cross vein reaching IV₃, although the portion of the base of IV₃, between the junction of the cross vein and V₁, must be held to belong to the cross vein. In the *Pararginae* and *Nymphalidae* the cross vein is withdrawn to the point of issuance of V₁. The lower Meadow Browns agree with the *Limnadiidae* and *Pieridae* in the position of the cross vein of secondaries. In the *Riodinidae* (I have only examined the type) the cross vein is specialized as in the Nymphalids, while it is slightly removed outwards in the *Theclinae* and *Lycaninae*. Where the cross vein fails to meet the point of issuance of vein V₁, lying outside of it, we must describe IV₃ as issuing from the cross vein, to which the base of IV₃, morphologically belongs.

A study of both fore and hind wings shows that on both the same processes are repeated, but the initial impetus for the changes seems to be always given by the hind wings. It is as if a wave passed over the wings, coming from the hind pair and breaking over the primaries, carrying these frail creatures further along their airy paths into their unknown future.

FURTHER NOTES ON SECTIONS OF AUGOCHLORA.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Since my note on the Mexican bees of the genus *Augochlora* was published I have been informed by Prof. Cockerell that he would not reply in this journal, but probably elsewhere. This conclusion seems to me to be remarkable, but I shall take this occasion to say what more I have to say on the subject and then leave it.

When I suggested two sections of *Augochlora*, in Trans. Am. Ent. Soc. XX., 147, I did not base my conclusion on the hind spurs alone, but because the two sets of species also agreed in other characters. I was too well acquainted with the characters of *Halictus* to suppose that a valid section of *Augochlora* could be maintained unless the spurs of a certain form were associated with other characters which indicated affinity. For example, *Halictus coriaceus* and *H. Forbesii* form a natural group of the genus and have finely serrate hind spurs. If I remember correctly *H. fuscipennis* belongs to the same group, but *H. parallelus*, which also has finely serrate spurs, does not. The sections of *Augochlora*, as I formed an idea of them at the time I mentioned them, might be defined as follows:

1. Slender species, having the sides of truncation of metathorax rounded above; hind spur of ♀ finely serrate; ventral segments of ♂ not metallic, or more or less metallic medially.

2. More robust species, having sides of truncation sharp; hind spurs of ♀ with 4-5 long teeth; basal ventral segments of ♂ metallic.

These characters belong to the species I indicated as coming in these sections, but it does not necessarily follow that other species with the same spur forms belong to either of them. Thus *A. splendida*, with basal fasciæ on second and third abdominal segments, may not belong to my second section.

That Prof. Cockerell did not know that the peculiar spur forms were secondary sexual characters of the females is shown by his failure to indicate the fact in the table; by his insisting that *A. viridula* and *A. fervida* could not belong to the second group on account of their spurs; by the use of the terms "ciliate or simple," which I think were taken from the males; and by his comparison of types through Col. Bingham. Smith's male types were referred to the first group without regard to any except their spur characters, which were of no value. If the types of *A. aspasia*, *A. aurora* and *A. splendida* had been males these species would have been referred to the first so-called subgenus; in other words, the author could not tell to which one of his own subgenera an *Augochlora* belonged. He failed to indicate valid characters of any natural group of *Augochlora*, and, in fact, showed that he had no idea of them.

SUCCESSFUL COLLECTING AT ELECTRIC LIGHT.

BY J. ALSTON MOFFAT, LONDON, ONT.

I herewith give a full list of the Lepidoptera new to the Society's collection, taken by Mr. J. W. Bice at electric light during the season of 1896.

Mr. Anderson and I picked out from amongst Mr. Bice's captures of about 2,000 mounted specimens of good material what seemed to be new to us; and after comparison with named specimens, or illustrations, having failed to recognize them, they were laid aside for others more competent than we to decide upon them.

I am greatly indebted to Dr. J. B. Smith for the patient endurance, amidst his multitude of professional duties, with which he attended to and promptly returned a number of small lots sent to him by mail—the unreasonable demands of the U. S. customs officer at the boundary line prohibiting their being sent in bulk by express, and thus increasing the labour connected with it. And not only for the names of the specimens, but also for interesting and instructive remarks upon many of the species; Dr. Hulst also assisting me with the Geometers. Most of those new to the collection were in single specimens of their kind, and Mr. Bice has generously donated them to the Society.

The names and their sequence are in accordance with Dr. Smith's list of 1891.

Protoparce carolina, Linn.

Cisthene unifascia, G. & R.

Lithosia bicolor, Grote.

Parorgyia parallela, G. & R.

Oedemasia badia, Pack.

Acronycta dactylina, Grote.

Acronycta impressa, Walk.

Cerma cora, Hub. Upon this species, Dr. Smith remarks: "Distinctly rare."

Semiophora tenebrifera, Walk.

Agrotis catherina, Grote.

Pachnobia salicarum, Walk.

Dicopis muralis, Grote.

Dicopis Thaxterianus, Grote. Dr. Smith says: "Very good indeed, not in my collection."

Eutotype bombyciformis, Smith.

Eutotype Rolandi, Grote.

Mamestra assimilis, Morr.

Hadena passer, Guen.

Hadena indirecta, Grote. Dr. Smith remarks: "Quite a new locality for this species. I have it from British Columbia and the Rocky Mountain region, but have never had it from anywhere near you."

Hadena diversicolor, Morr.

Taeniocampa vegeta, Morr.

Homoglaea hircina, Morr.

Cucullia florea, Guen.

Heliothis (Chloridea) *rhexia*, S. & A.

Galgula hepara, Grote. I took my first specimen of this insect in July, 1896, and sent it to Prof. Fernald, under the impression that it was a Tortricid, who kindly named it for me; Mr. Bice's specimen was so dissimilar that I did not recognize it.

Homoptera Woodii, Grote.

Palthis asopialis, Guen.

Brotis vulneraria, Hub.

Semiothisa dislocaria, Pack.

Boarmiä pampinaria, Guen.

Eubyia cupidaria, Grote.

Besides those altogether new, there were many interesting and unexpected varieties of common things brought to view by Mr. Bice's collection, which when disclosed were quite surprising to one not familiar with the extent and direction variation may go in some species, emphasizing with special force what Dr. Skinner gives in the subjoined extract as his experience with the butterflies:

"When I commenced my collection I was satisfied to have a single pair to represent the species, but now I cannot get enough individuals to represent all manner and kinds of variation brought about by natural causes. In the past I, therefore, knew this species or that, but now in many of our genera I nearly get brain fever in trying to determine where a species begins or ends."

BOOK NOTICES.

THE PARASITIC DISEASES OF POULTRY; by Fred V. Theobald, A. M., F. E. S.; 12 mo., pp. 120. Gurney & Jackson: 1 Paternoster Row, London, 1896.

It is encouraging to see a growing interest in applied entomology in England, and Mr. Theobald has given, in this handy little volume, a popular account of not only insect parasites but all other parasitic troubles likely to confront the poultry breeder. Not only is the little manual especially fitted for the wants of such, but it will doubtless find its way to the library of many other gentlemen who rely upon their estates to furnish fowls for their tables. The book is divided into several parts, relating to protozoan parasites, insect parasites, mite parasites, worm parasites, and vegetable parasites. Besides containing twenty-three illustrations, appendix I. gives a list of the parasites of *Gallus domesticus*, with the part of the fowl attacked by them; appendix II. a quite full bibliography of the literature of the subject, which, with a very complete index, renders the volume of scientific as well as practical value, and Americans will find it of interest to them as well as Englishmen. We wish Mr. Theobald success in his efforts to add to the practical entomological literature of his people.

F. M. W.

UBER DIE PALPEN DER RHOPALOCEREN. Ein Beitrag zur Erkenntnis der Verwandtschaftlichen Beziehungen unter den Tagfaltern; mit 6 Tafeln: von Dr. Enzo Reuter. Acta Societatis Scientiarum Fennicæ. Tom. XXII., No. 1. Helsingfors, 1896.

Entomologists in general, and lepidopterists in particular, will be interested in this work of Dr. Reuter's, occupying as it does a folio volume of 577 pages, the investigations, upon which the facts are chiefly based, requiring the examination of 3,557 palpi, belonging to 670 species, contained in 302 genera of the Rhopalocera. The work is divided into two parts: the first dealing with the direct microscopical examinations in descriptive form, while in the second is given the conclusions based on the same, as well as a discussion of other taxonomic characters allied to those brought out by himself, and their values. The plates are very fine, and the sixth of especial interest generally, as it presents, in the form of an evolutionary tree, the relations of the various groups and genera to each other.

Dr. Reuter calls attention to the fact that at the base of the basal joint on the inner side of the palpi of butterflies is found a clearly distinguishable, naked spot, which he proposes to term the basal spot, on the surface of which are fine grooves and ridges as well as sparsely placed foveæ, and great numbers of peculiar, subconical, hairy rugosities. These last, though occurring normally in the Diurnals, and especially in the Nymphalidæ, and being clearly distinguishable with a low power lens, have formerly remained unknown, or if known have not been mentioned in entomological literature.

These ridges were by Landois considered as stridulating organs, and the two last structures in analogy with those observed by Kræplin, Foel, Hauser, and others, on the antennæ of various insects and looked upon as being sense organs; but whether the peculiar structures in question served to convey the sense of smell, or, perhaps, some other and nearly related sense, is still an open question.

The Rhopalocera especially, of all the lepidoptera, have a special interest, because in them these cones present the greatest variations in form and are here the most highly developed.

Through further research, Dr. Reuter was convinced that a thorough study of the palpi, and especially of the basal spot, would afford not inconsiderable basis for a knowledge of the family affinities of the individual genera and groups contained in the Rhopalocera, and he therefore determined to direct his especial attention to them, extending his studies over all of the families, and where possible over the smaller groups, as also to study the material at his disposal from a direct and thoroughly morphological point of view.

F. M. W.

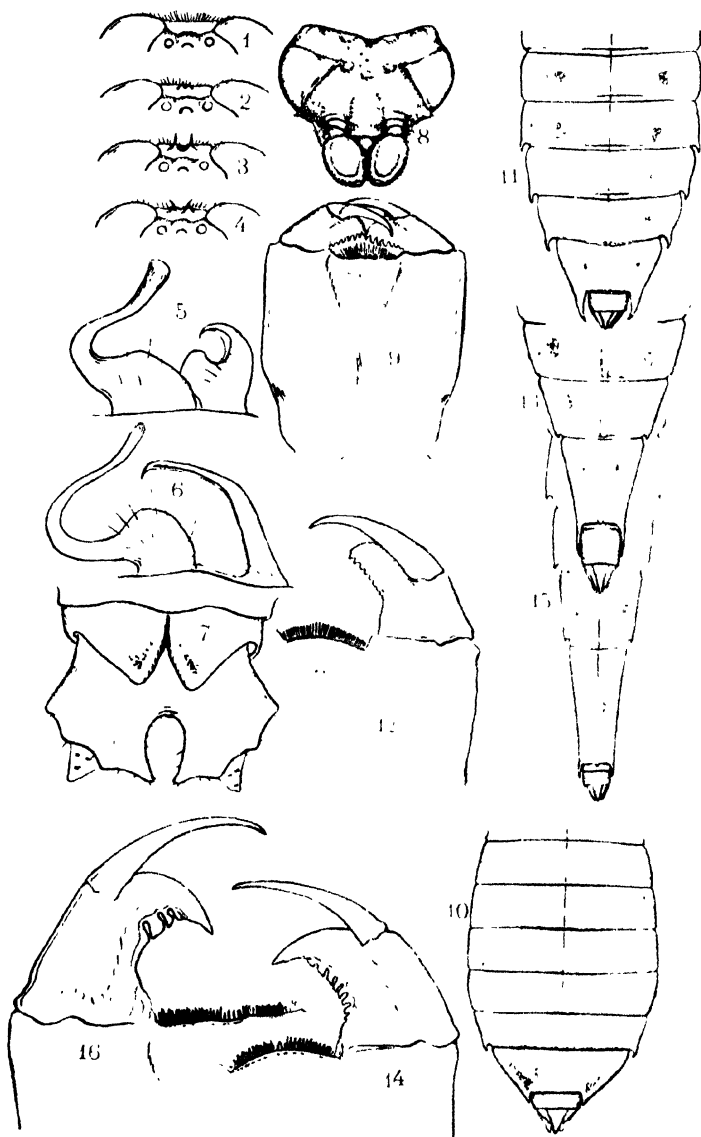
OVIPOSITION OF DORYTOMUS SQUAMOSUS (Lec.).

This is a very common beetle upon cottonwoods in Colorado, but I have never known anything of its injuries until recently, when I had the good fortune to come upon a female preparing a burrow for her eggs in a terminal flower bud. When first observed she had her beak in the side of the bud up to her eyes. The twig was broken from the tree and carried in the hand without in the least disturbing the work of the beetle. After about ten minutes she removed her beak, turned quickly about and applied the tip of her abdomen to the hole she had made. After remaining in this position for about two minutes she ejected a small amount of a dark brown, thick liquid, which completely covered and hid the opening in the bud. This done she walked away.

The bud contained the catkin of a staminate flower which was nearly ready to burst forth, and immediately beneath the puncture in the bud scales, on the axis of inflorescence, were found three eggs lying close together.

The eggs were light yellow in colour, with a very thin, flexible shell, and although somewhat irregular in shape, measured about .85 mm. in length by .5 mm. in breadth.

C. P. ILLETTE.



NORTH AMERICAN GOMPHINAE

The Canadian Entomologist.

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No. 8.

PRELIMINARY STUDIES OF N. AMERICAN GOMPHINÆ.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.*

(Continued from page 168.)

Herpetogomphus pictus, n. sp. Male.---Ithaca, N. Y.

Length, 49 mm.; abdomen, 35; hind wing, 27.

Green and brown, varied with black and yellow.

Face and frons above entirely yellow; a broad black band between the eyes, including the ocelli; antennæ black, the extreme rim of their cuplike insertions yellow. Occiput yellow, its border convex, ciliated with black. Rear of eyes brown, paler externally.

Prothorax fuscous, with a median twin spot greenish.

Thorax bright green, very thinly clad with brownish hairs, and faintly striped with brown. Dorsal and both lateral stripes subobsolete. Humeral stripe complete, irregular; antehumeral, isolated above, and separated from the humeral by a narrow green line. Subalar and antealar carinae brown.

Wings hyaline, flavescent at the base. Membranule minute, pale; stigma brown; veins black; costa faintly yellow externally.

Femora straw yellow, lined with black internally and each with a subapical incomplete ring of black. Tibiæ black, each with an external straw yellow line. Tarsi black; hind tarsi with a yellowish mark on the second and third segments superiorly.

Abdomen brown with transverse apical rings of black on segments 2 to 9; additional transverse lines of black on segments 3 to 7, at one-third the length of the segments. A middorsal yellow line, diffuse on segments 3 to 6, sharply bordered with black on 7 to 9. Apex of segment 10 and sides of 8 and 9 (except extreme lateral margin, which is black) and appendages yellow.

Superior appendages scarcely longer than the 10th segment, clad with blackish hairs. Seen from above they are divergent half their length, then parallel to their blunt

*An unfortunate misarrangement of the table for nymphs crept in at the end of the last paper. The two paragraphs immediately preceding the last one on page 168 both relate to *Stylurus*. They should therefore be consolidated and preceded by 7.

Prof. T. D. A. Cockerell has promptly and very kindly called my attention to an oversight in proposing the name *Orcus*, which is pre-occupied. I replace it with *Arigomphus*.

tips. Seen from the side they are thickest at the base and are gradually thinned and slightly declined to their truncate tips, beneath which are three or four rows of minute black denticles, extending more than half way to the base. Inferior appendage bifid for nearly half its length, the branches slightly divergent, truncate a little obliquely on tip, bent up at an angle with the declined basal portion, and bearing on each superolateral margin a broad quadrangular elevation just before the obtuse apex.

The appendages of the 2nd segment are very similar to those of *O. carolinus*. (See plate.)

Two ♂s from Ithaca in the Cornell University collection. One ♂ collected by Mr. J. O. Martin, at Ithaca, June 7th, 1897. A handsome species.

The occurrence of a *Herpetogomphus* at Ithaca was quite unexpected. All other species of the genus are from the extreme west and southwest. This one is related to *H. claps*, Selys, of Mexico.

Ophiogomphus johannus, n. sp. Male. - Wilmurt, N. Y.

Length, 43 mm.; abdomen, 30; hind wing, 26.

Black and yellow.

Labrum pale with a narrow brown margin which is broadened laterally. Face yellow; rear of frons and vertex except the rear black. Occiput yellow, its margin ciliated with black.

Thorax yellow, with thin brownish hairs; a narrow middorsal fuscous stripe subobsolete anteriorly, forking above with the carina to unite on either side with the fused humeral and antehumeral stripes, which are separated by a narrow yellow line only in their middle portion. Sides yellow, with an incomplete fuscous stripe on the 1st and a complete narrow one on the 2nd lateral sutures, and with fuscous markings above the bases of the legs.

Wings hyaline (immature).

Legs fuscous; front femora paler below.

Abdomen black, marked with yellow as follows: Sides of segments 1 and 2, except behind auricles; two lateral spots on 2 to 7; sides of 8 and 9, except the inferior margin; apical half of 10; a maculose middorsal line reduced to very narrow basal spots on 5 to 8, wanting on 9.

Superior appendages slightly longer than 10, yellowish, darker at the tip, cylindric, moderately divaricate and equally narrowed in their apical fourth to an acute tip. Seen from the side they are a little angulated near the base and beyond this point irregularly denticulate beneath to a point just before the tip, where they are suddenly contracted from below upward, leaving the point at the upper side.

Inferior appendage bifid almost to its base, its branches straight, cylindric, about as long as superiors and twice as stout, almost as divergent, each apparently forked by reason of a very large external upturned tooth at two-fifths of its length; at the extreme apex another stout upturned tooth. (For genital hamules see plate.)

A single ♂, with its cast skin, from Wilmurt, N. Y., in the Cornell University collection.

Ophiogomphus carolus, n. sp. Male and female.—Ithaca, N. Y.

Length, 40-42 mm.; abdomen, 28-31; hind wing, 24-26

Greenish-yellow and blackish-brown.

Face greenish-yellow, paler toward the mouth. Rear of frons and vertex except the rear, black. Occiput yellow, its slightly convex margin ciliated with long black hairs. In the female there is generally in front of the margin a pair of black-tipped spines, whose various development is shown in plate, figs. 1 to 4. These sometimes occupy the margin which then becomes notched between them. Rear of eyes black above, mottled with paler below.

Prothorax blackish, its hind lobe with a median twin spot and a lateral spot each side yellow.

Thorax greenish, its dorsal stripes fused, enveloping the carina and forking with it above to meet the humeral. Antehumeral stripe isolated above, sometimes meeting the humeral near its upper end, but well separated through most of its length by a narrow greenish line. A partial brown line on the 1st lateral suture and a narrow complete one on the 2nd.

Legs black, front femora paler below.

Wings hyaline, often flavescent at base, costa black; stigma cinereous.

Abdomen cylindric, a little narrower in its middle two-thirds, superiorly blackish with a maculose yellowish middorsal line of lanceolate spots on segments 3 to 7, of quadrangular basal spots on 8 and 9. Inferiorly, whitish with fuscous apical spots on most of the segments. Ten yellow; fuscous at both ends.

Male appendages: superiors, longer than the 10th segment, cylindric; seen from above, with acute apices divergent; seen from side, fusiform, with truncate apices, denticulate beneath for one-third their length. Inferior appendage (see plate, fig. 7) bifid by a rounded notch, each branch somewhat flattened with four distal angles (as shown in the figure) or sometimes with only two (merely obliquely truncate), always with an upturned tooth at the outermost angle, sometimes with another at the innermost.

The genital hamules are shown at fig. 6 in the plate. These appear to be quite constant in form.

Female appendages fuscous, longer than 10; anal segment as long as the 10th. Vulvar lamina about as long as the 9th segment; bifid except basal fourth, the branches enclosing an oval notch beyond which their incurved apices meet and then abruptly separate in short, oval, divergent points.

Described from more than seventy bred specimens (some of which will find their way into the collections of all my correspondents), from a single ♀ in the Cornell University collection, and from five specimens captured in May by Mr. Chester Young and Mr. J. O. Martin. I collected nymphs in October which emerged on my table in March. It was easy to collect the nymphs by hundreds in April, and in May the banks of the waters they frequented were fairly covered with exuviae. Yet, outside of my breeding cages I saw but one live imago, notwith-

standing I was doing much collecting at all times and in all places considered favourable. Where were they?

I have recently bred *A. villosipes*, Selys, by scores, and I find its exuviae sticking to every bank about Ithaca, yet I have not seen a single imago at large. The imagoes, where are they?

Arigomphus australis, n. sp. Male.—Gotha, Fla.

Length, 52 mm.; abdomen, 39; hind wing, 27.

Black and olive.

Face yellow with dense black pubescence.

A black stripe across base of labrum and another across the anterior margin of the frons. Rear of frons and whole of vertex black. Occiput yellow, convex, ciliate with black. Rear of eyes black above, yellow below.

Prothorax black with a median twin spot and a larger spot each side yellow.

Thorax olivaceous, striped with brown as follows: Dorsal stripes fused to form a cuneiform dorsal spot, not reaching the base, and narrowly divided with yellow along the extreme summit of the carina. Its narrow upper end is met by the strongly incurved antehumeral stripes, which are well separated from the narrower humeral stripes. Narrow but distinct stripes on both lateral sutures.

Legs black. Front femora pale within.

Wings hyaline, costa yellow, stigma brown. Veins black. Hind wing chalky near anal margin.

Abdomen long, slender. Segments 3 to 6 cylindric, narrower than terminal segments, entirely black. Remaining segments black, marked with yellow as follows: Sides of 1 and 2; dorsal lanceolate spots on 7 and 8; sides of 7 apically, and sides of 8 to 10 entirely yellow, 8 one-half longer than 9. Superior appendages about equalling 10, pale brown, divaricate at a right angle. Seen from above the inner margin is straight, the outer margin ends in a stout tooth, beyond which it is cut to a long acute point. Seen from the side each is gradually narrowed to a pointed apex, with a large acute tooth directly under the basal fourth, not visible at all from above. Inferior appendage with branches more divaricate, shorter, very little upcurved, ending under the apex of the lateral tooth.

One finely coloured ♂ taken by Mr. Adolph Hempel, in Orange Co., Fla., on the 21st of April, 1897.

At the same time Mr. Hempel took a *Progomphus obscurus*, Ramb., with its skin, in transformation. While the nymph was known by fair supposition, it appears not to have been reared before.

Mr. Hempel sent me also a nymph of the extraordinary type referred by Hagen (Trans. Amer. Ent. Soc., XII., 277, 1885) to *Aphylla producta*, Selys. It is time for someone to find the imago in Florida.

Gomphus umbratus, n. sp. Male and female.—Ithaca, N. Y.

Length, 50-54 mm.; abdomen, 35-39; hind wing, 30-32.

Brown and olive, variable.

Face yellow, washed with brown in indistinct lines across the base of the labium and close under the frontal prominence. Rear of frons above and whole of vertex brown. Antennæ black. Occiput yellow, its hind margin convex (male and female), ciliated with black.

Prothorax variable, but always showing a median twin spot of yellow.

Thorax *brown* with a pair of nearly parallel dorsal stripes of yellowish-green, each sending at its lower end a spur against the carina, and at its upper end another spur around the isolated upper end of the antehumeral stripe of brown. Humeral and antehumeral stripes of brown fused at lower end and near the upper end, and sometimes all the way between. Brown stripes of the lateral sutures overspreading the area between them, or sometimes the sides of the thorax wholly brown.

Femora brown, with numerous long spines in females. Tibiæ black, with a yellowish external line on each. Tarsi black.

Wings hyaline; their basal articulation and stigma rich brown when fully coloured. Costa yellow externally, veins black.

Abdomen cylindric in the female, slightly narrowed between the ends in the male, fuscous; basal fourth of middle segments paler and including a yellowish spot inferiorly. Middorsal stripe of yellow continuous at the base, reduced to lanceolate spots on segments 4 to 8, on 8 very short, on 9 wanting, 10 with a yellow spot in the female, uniform olive-brown in the male.

Male superior appendages flattened, a little arched. Seen from above the inner margin is nearly straight; at two-thirds their length they are cut obliquely to form a long point with an obtuse angle on the external margin. Seen from the side a low obtuse lobe appears on the interno-inferior carina just beyond the external angle. Inferior appendages a little shorter, more divergent and strongly upcurved at apices.

Female vulvar lamina transverse, one-third as long as wide, notched in the middle.

Described from seventeen specimens (14 males and three females), several of them bred, all obtained at Ithaca, N. Y., in May. A common species; next to *G. descriptus*, Banks, perhaps the commonest of the season; more variable in coloration than any other Gomphine I have seen.

Stylurus segregans, n. sp. Male — Havana, Ill.

Length, 61 mm.; abdomen, 44; hind wing, 35.

Face yellowish. Frons yellow, infuscated superiorly. A narrow fuscous stripe in front of ocelli. Frons and the ridge-like elevations behind each lateral ocellus pilose with soft black hairs. Occiput yellow, its border straight, ciliated with stiff black hairs.

Thorax fuscous; dorsum with two isolated lateral yellow stripes, divergent anteriorly. A narrow antehumeral line and a broad stripe down the middle of each of the lateral sclerites, yellow.

Legs brownish, paler internally, with black spinules. Claws pale, with apex and inferior tooth black.

Wings hyaline.

Abdomen fuscous, marked with yellow as follows: Dorsum of segment 1, a line on 2, basal middorsal spots on 3 to 8, extreme apex of 8, sides of 1 and 2, basal lateral spot on 3 to 7, sides of 7 and 8 except extreme lateral margin and apex, and all of 10.

Male superior appendages yellowish-brown, much longer than 10, divaricate at almost a right angle, slightly incurved toward the tip and cut obliquely to form an obtuse external angle at two-thirds their length, and a supero-internal point. The bevelled portion is minutely denticulate opposite the apices of the inferior appendage. No teeth or spines. The inferior appendage is bifid half its length with branches strongly divergent and strongly upcurved, their apices resting outside the bevelled portion of the superiors. Posterior genital hamule simple; pointed, directed forward at an angle of 45 degrees with the axis of the abdomen.

Name refers to its extremely local occurrence.

The single imago was obtained by Mr. C. A. Hart and myself, by rearing a nymph which we found crawling from the water upon bur-rush leaves, 23rd June, 1896, in the mouth of Quiver Creek. I obtained several exuviae there, and several others later at McHairy's mill-dam some miles further up.

The nymphs of this and of the preceding species will be described in a forthcoming bulletin of the Illinois State Laboratory of Natural History.

Since this paper was written, I have obtained at Ithaca, N. Y., nymphs which can be none other than *Dromogomphus spinosus*, Selys. They fall in the same section of the table with *Arigomphus*, *Stylurus* and *Gomphus*, from all which they are distinguished by a sharp middorsal longitudinal ridge, ending in a straight apical spine on the 9th abdominal segment.

EXPLANATION OF PLATE 7.

Figs. 1, 2, 3 and 4.—The occiput of the female of *Ophiogomphus carolus*, seen from the front, showing variations in occipital spines.

Fig. 5.—Genital hamules of *Ophiogomphus johannus* from the left side, inverted.

Fig 6.—Do. of *Ophiogomphus carolus*.

Fig. 7.—Inferior abdominal appendage of *O. carolus* seen from below.

Fig. 8.—Head of nymph of *Lanthus parvulus*, seen from above and in front.

Fig. 9 —Mentum of labium of do. from above.

Fig. 10 —End of abdomen of do.

Fig. 11.—End of abdomen of *Gomphus fraternus*, nymph.

Fig. 12.—Part of labium of do.

Fig. 13.—End of abdomen of *Arigomphus pallidus*, nymph.

Fig. 14.—Part of labium of do.

Fig. 15.—End of abdomen of *Stylurus segregans*, nymph.

Fig. 16.—Part of labium of do.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXVI. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(*Continued.*)

BELLAMIRA, Lec.

With this genus begins a series of beetles in which the neck is longer than in *Encyclops*, owing to the constriction of the head being near the eyes. *B. scalaris*, Say, is a very fine insect, varying in length from .75 to 1.20 inch. The form is slender, the elytra tapering greatly to and rounded at tip, deeply sinuate at sides, the tip of the abdomen uncovered. The prothorax is bell-shaped, with prominent, rather flattened hind angles. Colour brownish; most of the head, the greater portion of the fore and middle legs, the bases of the hind femora and the bases and tips of the ventral segments inclining to reddish or even yellowish. Antennæ rufous. Elytra brownish, with a large common, lighter (golden-sericeous), wedge-shaped mark (wavy on the edges and sometimes interrupted at about one-third its length by a transverse brownish band) which extends about two-thirds to tip. The body is finely and densely, in most places rugosely, punctured, clothed with fine golden pubescence, which is much denser on certain parts, notably the abdomen. Recorded as breeding in birch, and has been seen ovipositing in maple stumps.

STRANGALIA, Serv.

Includes two extremely elongate slender species, having the general form of *Bellamira*, but much smaller. *S. bicolor*, Swed., is entirely rufous except the eyes, the tips of the mandibles, the incisures of some of the tarsal joints and the elytra, which are black. Length .48-.56 inch. *S. luteicornis*, Fabr., is rufo-testaceous or yellowish; the eyes, some markings on the under side, a ring at the tip of the hind femora, two dorso-lateral stripes on the prothorax, a narrow basal and three other transverse bands on the elytra, black. Length .36-.52 inch.

TYPOCERUS, Lec.

The impressed poriferous spaces on the antennæ, which separate this genus from *Leptura*, are to be looked for near the bases of the sixth and following joints, appearing as elliptical smoother spots. A good plan is to take the common *T. velutinus* as a type for examination, since in this species they are very distinct, and having once seen them their detection is easy in the remaining species. The four Canadian

forms may be separated by their colour, but it is to be remembered that the elytral pattern is subject to variation. None of them have the prothorax strongly rounded on the sides, but the form of this segment is campanulate. Excluding the extra-limital forms, those belonging to our fauna may be thus known :

- A. Body above and beneath, legs and antennæ entirely black, except occasionally a rufescent spot in humeral region. .36-.44 in. *lugubris*, Say.
- AA. Body beneath variable, antennæ blackish, legs black or rufous, elytra never entirely black, usually banded.
 - b. Legs black. Elytra black with three transverse bands and basal spot yellow, the anterior two bands sometimes united at suture. .36-.40 in. *sparsus*, Lec.
 - bb. Legs ferruginous.

Prothorax very coarsely sparsely punctured. Elytra black, with basal spot and three transverse bands (the anterior two frequently united at suture) yellow. .40-.52 inch. *zebratus*, Fabr.

Prothorax more finely and densely punctured. Elytra brownish or reddish, with yellow markings much like those of the preceding species, but these may be incomplete or even wanting. .40-.56 inch. *velutinus*, Oliv.

T. zebratus (fig. 28) is said to mine in white oak. It bears considerable resemblance to *Leptura nitens*, from which it, however, easily separates by the generic character. *T. sparsus* is unknown to me, and the description is taken from Mr. Leng's table; *velutinus* is often very abundant on flowers in the summer months.

LEPTURA, Serv.

This genus is of very large size, and many of the species are quite abundant. There is no uniformity of facies to give a ready clue to its separation from allied groups, some of the species resembling *Strangalia* in the shape of the prothorax, while others are very different.

The succeeding synopsis follows those of Dr. Leconte and Mr. Chas. W. Leng, with but few changes, chiefly such as are made necessary by later corrections of synonymy.

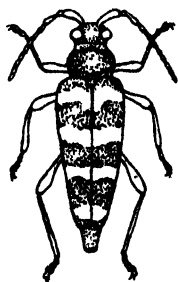


FIG. 28.

- Prothorax more or less triangular, or campanulate, widest at base... 2.
 Prothorax nearly quadrate, or else more or less rounded or subcampanulate, usually constricted in front and behind, hind angles not prolonged 23.
2. Hind angles of prothorax prolonged 3.
 Hind angles not prolonged 16.
3. Very large species (1.20 in.), prothorax strongly narrowed from the base, which is broadly but deeply bisinuate, posterior transverse impression distinct. Elytra widest at base, gradually narrowed behind, truncate and emarginate at tip, which is not margined. Black with velvety pubescence, elytra red, apex black, antennæ feebly serrate, elytra not sulcate *emarginata*, Fabr.
 Small or moderate sized species 4.
4. Prothorax without distinct transverse basal impression. Small species, elytra sub-parallel at sides, not spotted nor banded, but uniformly dark. Prothorax often red, hind angles usually small. 10.
 Prothorax with transverse basal impression often deep. Moderate sized species, elytra usually narrowed behind, often very much so, and frequently spotted, striped or banded 5.
5. Prothorax convex, with the sides much rounded in front of the middle, a transverse depression at base, hind angles small. Elytra black and yellow 14.
 Prothorax with sides not much rounded in front of the middle. 6.
6. Prothorax strongly narrowed from the base, usually regularly so. 7.
 Prothorax subcampanulate, transverse basal impression deep, hind angles broad, laminate, fourth joint of antennæ shorter than usual, elytra not banded nor spotted 15.
7. Elytra black or testaceous with black tip. Abdomen with the third, fourth and base of fifth ventrals red. Prothorax finely punctured. .48-.52 in. *plebeja*, Rand.
 Elytra with black and red or yellow markings .. 8.
8. Antennæ annulate 9.
 Antennæ not annulate. Black, elytra very dehiscent, and not narrowed behind, coarsely punctured, sides of elytra, metathorax and abdomen red, thighs red with black tips. .36 in. *cruentata*, Hald.
9. Female reddish-yellow, varied with black beneath, legs more or less black; above with top of head, a discal thoracic stripe or spot, scutellum, sutural and side margins and transverse sub-median elytral band, black. Male black, base of legs and discal elytral

- vitta (usually broken), as well as a small spot under the humerus, yellow. Antennæ annulate in both sexes. .48-.60 in. *subhamata*, Rand.
- Blackish, region of the mouth often yellowish. Legs and elytra testaceous or yellowish, the latter with sutural discal and lateral marginal vittæ black. .32-.52 in. *lineola*, Say.
10. Elytra margined and usually rounded at tip. 11.
Elytra not or scarcely margined at tip. Blackish, pubescence white, head, legs and first antennal joint sometimes reddish or partly so. .24-.30 in. *subargentata*, Kirby.
11. Black, elytra blue, polished coarsely and sparsely punctured, antennæ and legs either black or yellow. .24 in. *chalybea*, Hald.
Black or piceous, head and prothorax often reddish, legs and antennæ frequently in part yellow. 12.
12. Elytra shining, very coarsely punctured, tip subtruncate. Colour black, legs black, head and prothorax reddish. .26-.36 in. *capitata*, Newm.
Elytra more finely punctured, pubescence fine, white, prothorax and head rarely (never?) at once red or yellow, though often separately so. 13.
13. Antennæ piceous; anterior femora and base of middle ones yellowish. Upper surface piceous or (in the var. *hamatites*, Newm.) the prothorax may be reddish. Terminal ventral segment of female simple. .16-.24 in. *nana*, Newm.
Antennæ piceous, basal joint yellow. Anterior femora and the bases of middle and hind ones yellow. Terminal segment of female with a slight tuberosity near apical margin. Colour piceous or blackish, thorax usually with yellow margin. .22-.28 in. *exigua*, Newm.
14. Black, antennæ brownish, legs and tips of abdominal segments ferruginous, pubescence golden, so dense as to conceal most of the surface colour except on the legs, antennæ, tips of abdominal segments, middle of prothorax, five elytral bands and the sutural margin. .40-.52 in. *nitens*, Forst.
Black, antennæ and tibiæ often reddish, pubescence cinereous, not concealing the colour. Elytra yellowish, base, tip and two intermediate (usually interrupted) bands black. .31-.38 in. *sexmaculata*, Linn.
15. Black, elytra sometimes rufous or testaceous, prothorax very densely coarsely punctured, elytral punctuation less dense. Antennæ not

- annulate, elytra sharply obliquely truncate at tip. .40-.60 in.....*nigrella*, Say.
16. Antennæ annulated (except in ♂ of *canadensis*). 17.
Antennæ not annulated. 19.
17. Elytra parallel, elongate, truncate at tip, front of head with transverse impression. Colour black, punctuation fine and dense. Legs reddish or brownish. .40 in.....*pedalis*, Lec.
Elytra narrowed from the base 18.
18. Tips of elytra deeply truncato-emarginate, antennæ serrate in the ♂.
Punctuation very coarse and close, sub-confluent. Black, elytra usually with large red basal spot, which may extend (in the var. *erythroptera*) over the entire surface. .48-.76 in..*canadensis*, Oliv.
Tips of elytra truncate or feebly emarginate, body of ordinary form, not very stout; punctuation of elytra finer, well separated. Black, elytra reddish, abdomen red ♂ or black ♀*rubrica*, Say.
Tips of elytra nearly rounded, very dehiscent. Form very short and stout, head broad, elytra coarsely punctured. Black, elytra often with reddish or yellowish submarginal stripe or entirely testaceous. .36-.48 in.....*vagus*, Oliv.
19. Body densely golden pubescent. Blackish, elytra testaceous, often darker at sides. .48-.56 in.....*chrysocoma*, Kby.
Body only moderately or sparsely pubescent..... 20.
20. Black, elytra reddish or testaceous, wholly or for the greater part. 21.
Black, elytra black, each with four yellowish spots, thighs pale at base. .40-.48 in.....*octonotata*, Say.
21. Elytral margin very deeply sinuate (on viewing the insect from the side). Prothorax with a tolerably well-marked median channel, at bottom of which is an abbreviated raised line. Black, elytra reddish except at tip, which is rather broadly obliquely marked with a black blotch and truncate. .52-.75 in.....*proxima*, Say.
Elytral margin not deeply sinuate..... 22.
22. Larger, prothorax with very distinct median channel which is wider behind. Brownish red, elytra paler, with a submarginal dark spot near the middle, tip obliquely truncate. .48- 52 in..*biforis*, Newm.
Smaller, prothorax without median channel. Black, elytra reddish to testaceous, tip blackish, squarely truncate. .40-.48 in.....*sanguinea*, Lec.
23. Prothorax hardly narrowed anteriorly and not constricted behind.
Seventh and following antennal joints with a raised line beneath.

- Black, elytra sometimes (in var. *turidipennis*, Hald.) testaceous or with the tip alone dark. .32-.52 in *mutabilis*, Newm.
- Prothorax much, often suddenly, narrowed anteriorly, with or without distinct constrictions. 24.
24. Basal prothoracic constriction very deep, sides strongly rounded. .26.
Basal prothoracic constriction feeble or absent. 25.
25. Prothorax densely punctured, with median smooth line. Neck very close to eyes. Black, without markings. .36-.40 in. *pubera*, Say.
Prothorax sparsely punctured, head longer behind the eyes. Usually black, elytra with or without a narrow discal yellow vitta. Varies to entirely testaceous. 40-.52 in. *vittata*, Oliv.
26. Black; legs more or less yellow; prothorax (in var. *ruficollis*, Say) sometimes red, nearly smooth, except at base. Antennæ with tendency to become reddish at tips of joints. .28-.32 in. *sphaericollis*, Say.
- Black, legs almost entirely yellow in most specimens, prothorax occasionally red, finely and sparsely punctured, except at base, where it becomes more pronounced. Antennæ with the tips of the joints more evidently reddish, elytra with side margin and long discal vitta yellow. .24-.40 in. *vibex*, Newm.
- Probably the only serious difficulty to confront beginners in the use of the above table will arise in making the choice between the first two divisions; *i. e.*, 2 and 23. Should doubt arise here the assumption may be made that it belongs in the latter, when reference to other thoracic characters or to those of colour will soon show if the student is on the wrong track. The measurements here, as elsewhere, are in the main those of Mr. Leng, though I have frequently extended them, as shown by specimens in my own collections.

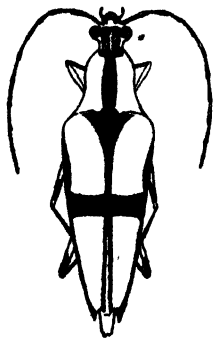


FIG. 29.

With regard to food habits very little can be said, so few of the *Lepturae* having been bred; while the perfect insects are commonly found on flowers, these give little or no clue to the feeding habits of the larvæ. Mr. Harrington has taken *L. subhamata* (fig. 29) on oak and also in a beech log, while the pupa of *L. canadensis* has been found in a hemlock stump. *L. nitens* bores, as a larva, in black oak, *L. vagans* in the yellow birch and pignut hickory, *L. proxima* has been reared from maple.

It will probably be noted that the authorities cited for certain of the species are not the same as those in the Check List. The reasons for these changes will be found in Mr. Leng's paper on the genus. Both *L. nana* and *L. exigua* are included in the table, although I am not sure that the latter occurs within our limits; the former has been recorded by Dr. Hamilton (CAN. ENT., XXI., pp. 33 and 108). The name *zebra* is replaced by *nitens* on the ground of priority; *sphaericollis* has been preferred as the specific and *ruficollis* as the varietal name, following Mr. Leng. In all probability *L. lacustris*, Casey, described from Michigan, will be found in Ontario. It differs by description from *sanguinea* in the much stouter male antennæ, and by the apices of the elytra being narrowly and obliquely truncate, the truncation sinuate, the angles, especially the exterior, very acute and prominent.

DESCRIPTIONS OF NEW SPIDERS.

BY NATHAN BANKS, WASHINGTON, D. C.

Teminius affinis, n. sp.

Length ♀ 13 mm.; ceph. 5 mm. long, 3.5 mm. wide, patella plus tibia IV. 6 mm. long. Cephalothorax red-brown, darkest around head; mandibles dark red-brown; legs and palpi yellow-brown, lighter at tips; sternum dark red-brown; abdomen nearly black above, with faint indications of a light median streak, in the base of which is a black spear-mark; venter dark gray; spinnerets yellow. Posterior row of eyes straight, broader than anterior row; P. M. E. round, separated by their diameter, nearer to each other than to the larger P. S. E.; A. M. E. about half their diameter apart, and slightly nearer to the A. S. E. than to each other. Legs quite long, no spines above or below on tibia I., and none above on tibia IV.; thick scopulas to all tarsi and metatarsi (except IV.). Sternum broad; the abdomen long and narrow; the upper spinnerets distinctly two-jointed and much longer than the lower pair, the second joint more than twice as long as wide. The epigynum shows a rounded cavity, slightly longer than broad, broader behind than in front, the anterior portion paler than the rest; there is a median septum which in the fore part is narrow, but quite suddenly broadens at the middle and then tapers to the broadly rounded tip.

One specimen, Brazos Co., Texas. It differs from *T. continentalis*, Keys, in the larger size, position of eyes, spines on legs, and shape of the epigynum.

Thargalia canadensis, n. sp.

Length ♀ 7 mm.; ceph. 2.8 mm. long, 2 mm. broad; patella plus tibia IV. 2.8 mm. Cephalothorax reddish yellow-brown, pars cephalica black; mandibles dark red-brown; anterior pairs of legs yellowish, hind pairs reddish, all femora with a black stripe each side, those on the fore pairs are much broader at base, the under side of tibia and metatarsus IV. infuscated; maxillæ dark brown, pale on margin; sternum reddish; coxæ yellowish; abdomen black above, paler below, reddish around the epigynum, above with a narrow white band near base, and another just before the middle, the latter rather indented on the median line. Posterior eye-row procurved, P. M. E. round, over one and one-half their diameter apart, closer to the equal P. S. E. Anterior eye-row procurved, shorter than the posterior, A. M. E. about as large as P. M. E., about once their diameter apart, very much closer to the equal A. S. E., which latter are well separated from the P. S. E. Two pairs of spines under tibiæ I. and II. Sternum one and one-fourth longer than broad, nearly as broad in front as at second coxæ, rounded to the pointed tip. The abdomen has a horny basal shield which extends but a short distance on the dorsum. The epigynum shows two oval openings marked in front by a continuous sinuous ridge.

One specimen from Ottawa, Canada. (W. H. Harrington.)

Anyphæna fragilis, n. sp.

Length ♀ 5 mm.; ceph. 2 mm. long, 1.3 mm. broad; patella plus tibia IV. 1.8 mm. Cephalothorax pale yellowish brown, black around eyes, a black line reaching from between the P. M. E. to the indistinct dorsal groove. Sometimes the sides are rather more infuscated. Mandibles dark brown, with a pale spot at base; maxillæ and lip pale, fringed with black hair; legs pale whitish, with blackish rings at base, middle, and tip of tibia, base and tip of metatarsus and tip of tarsus; the bristles are arranged in lines so as to leave smooth spaces. Sternum pale, infuscated, darker on the sides. Abdomen pale, above with two rows of black spots, and some on each side; venter pale, spinnerets infuscated. Cephalothorax not much narrowed in front, radial furrows obscure, P. M. E. about twice their diameter apart, scarcely closer to the equal P. S. E. A. M. E. smaller than P. M. E., about their diameter apart, and nearly as far from the larger A. S. E. Mandibles rather large and stout, vertical. Legs short, two pairs of spines under tibiæ and metatarsi I. and II., the second pair at about middle of length; hind legs more

numerously spined. Sternum one and one-third longer than broad, broadest near middle, sides rounded. Abdomen slender, fully twice as long as broad; ventral furrow nearer to epigynum than to the spinnerets. The epigynum shows a transversely rounded area, trilobate behind, the median lobe smaller and pointed, in each side a curved reddish opening.

Jacksonville, Florida; April. Collected by Messrs. Laurent and Castle.

Theridium dorsatum, n. sp.

Length ♀ 4 mm.; femur I. 2.1 mm., femur III. 1.2 mm. Cephalothorax dark yellow-brown, brown on the edges, eye region blackish, and behind is a triangular brown spot with its apex on the dorsal groove. Abdomen grayish, with a pale central mark bordered by black, from the projections faint marks run to the sides; sides pale; venter black, with a large central triangular silvery spot, spinnerets surrounded with black; a curved black line reaches from the anterior portion of the abdomen across the sides to the middle of the venter, where it joins the dark ventral area; sternum brown; legs pale yellowish, with brownish bands at the middle and ends of the joints, those on middle of femora I. and II. are narrow and oblique. P. M. E. are about their diameter apart, A. M. E. much more than their diameter apart; sternum triangular, a little longer than broad in front; legs moderately long and slender, metatarsus I. about equal to tibia I.; abdomen a little longer than broad and not very high. The epigynum shows a rounded semi-triangular lobe projecting behind.

Olympia, Washington. (Trevor Kincaid). Readily known by the large silvery spot on venter.

Theridium elevatum, n. sp.

Length ♀ 4 mm.; femur I. 2 mm. Cephalothorax yellow, with a black stripe each side and one on the middle, the latter with a short lateral spur each side at the dorsal groove and growing narrower behind; mandibles with brown lines. Abdomen gray, mottled with white and brown; the white is in the form of curved lines; venter dark, with two white spots in front of the spinnerets; sternum yellow, with some short black lines reaching from the sides; legs pale, banded and thickly spotted with dark brown, bands at ends of joints, base and middle spotted. P. M. E. hardly their diameter apart; A. M. E. equal to P. M. E., more than their diameter apart; mandibles slender; sternum triangular, barely longer than broad in front; legs short and stout, femur

I. not quite twice as long as femur III., metatarsus I. barely longer than tibia I.; abdomen higher than long, globose; region of epigynum swollen; there is a small median triangular black projection or finger.

Brazos Co., Texas; Sept.

Plasiocrarius lobiceps, n. sp.

Length 1.5 mm. Cephalothorax yellowish with a black margin, each eye with a black ring, a black line on each side of the lobe; mandibles yellowish, legs and palpi yellowish, sternum red, black on margins; abdomen black, spinnerets pale. Head of male moderately elevated into a large lobe, bearing the P. M. E., which are large and scarcely twice their diameter apart; a hole on each side just behind the S. E.; the mandibles show a series of transverse lines on the outer side; legs moderately long, first pair longest, no spines above on the tibiae; sternum broad, triangular, bluntly pointed behind. Male palpi quite long; the tibia with a broad extension above and a hook on the inner side; the tarsus short, truncate at tip; the bulb, in side view, is constricted near the middle, the upper part crossed by two transverse dark lines, the black style coiled around the tip once, a small triangular hook near base of bulb. In the female the head is scarcely elevated; the epigynum shows a semicircular area limited by a concave ridge in front, from which there extends behind a gradually broadening furrow with its margins at tip, curved outward and backward.

One from Chicago, Ill., under leaves in October; others from Salineville, Ohio. (A. D. MacGillivray.)

Icius canadensis, n. sp.

Length ♀ 5 mm.; ceph. 2.4 mm. long, 1.9 mm. broad; tibia plus patella IV. 2 mm. The male but little smaller. Cephalothorax red-brown, black in eye-region; mandibles reddish; leg I. reddish except the yellowish tarsi, other legs wholly pale yellowish. Sternum infuscated; abdomen brownish with a narrow white line around base, and pale chevrons toward tip, venter pale gray, with a straight jet black stripe each side, and a narrow basal median spear-mark; a black spot each side at base of spinnerets; in ♂ more white hair around the A. M. E. Eye-region one and a fourth broader than long, broader behind than in front, first eye-row curved; eyes of second row half way between dorsal and lateral eyes; cephalothorax moderately high; mandibles vertical, with one stout tooth on inner edge of fang-groove. Legs moderately long, IV. pair longest, I. pair very stout, three pairs of spines on the tibia and

two on metatarsus I., metatarsus IV. spined only at tip, anterior coxæ separated by nearly width of labium. Sternum once and a third longer than broad, broadest between coxæ I. and II. Abdomen once and a half longer than broad, rounded at base, pointed behind, moderately high. The epigynum shows two oval cavities, more than their diameter apart, some distance in front of a posterior median indentation. The male palpus is short; the tibia has a short, sharp projection on the outside; the bulb projects beyond the base, and the upper part is much smaller than the lower, showing a curved tube on the outside, and terminating in a stout, straight, black stylus.

A few specimens from Ottawa, Canada; collected by Mr. W. H. Harrington.

DIPTERA FROM YUCATAN AND CAMPECHE.—I.

BY C. H. TYLER TOWNSEND, FRONTERA, MEXICO

A few specimens of Diptera were taken in the Yucatecan region, in April and May, 1896, by the writer. The present paper describes the new species. More material from that interesting fauna will doubtless be secured in time, and will form the subject of future papers of this series. For an account of the peculiar bio-geographical aspects of the *Yucatecan* fauna and flora, the reader is referred to the writer's second paper on the Bio-geography of the Southwestern U. S. and Mexico (Trans. Texas Acad. Sci., 1897).

TABANIDÆ.

1. *Tabanus campechianus*, n. sp.

One ♀. April 25th. Taken near Campeche, between that place and Esperanza (State of Campeche). Seems to approach *T. nigrovittatus*, McQ., according to Osten-Sacken's description.

Length, $8\frac{1}{2}$ mm. Palpi almost white, with some white as well as black hairs. Face brownish, covered with a white bloom. Front brown, yellowish-gray dusted; frontal callosity nearly square, rounded on upper corners; a smaller longitudinal callosity above it twice as long as wide, and with a tendency to a linear elongation posteriorly. Callosities brown. Front parallel, about one-sixth width of head, parallel portion only a little more than twice as long as wide. First two joints of antennæ pale yellowish, second joint ending above in a sharp spur; third joint reddish-yellowish, annulate portion black, process of base angular, but not enough developed to form a right angle, greatest width

of third joint about twice the extreme basal width. Annulate portion of third joint hardly as long as the basal portion, about four times as long as wide. Thorax cinereous dusted, with a sparse short white pubescence, with four somewhat indistinct wide brownish vittæ. Pleura whitish pollinose. Scutellum cinereous, with a yellowish tinge on margin. Abdomen brownish-yellow, a well-defined, moderately broad median yellowish-white pollinose vitta of even width, becoming indistinct on sixth segment. A brown vitta on each side of and limiting the median vitta, forming a triangle on each side on third and a subarcuate marking on each side on second segment; but these brown vittæ are faintly represented in full width on second and third segments by a shading of brown supplementing the triangular and arcuate markings. On the outside of the brown vittæ on each side there is a lateral yellowish-white pollinose vitta like the median one but not so distinct; while still outside of this is another lateral brown vitta limiting the lateral white one on the inside and parallel with the edge of the abdomen on the outside. The fourth segment has the brownish-yellow considerably more tinged with brownish, and the fifth, sixth, and seventh are quite brownish. Pubescence very scanty, hairs of white portions whitish, of brown portions in main blackish, except on hind margins of posterior segments. Legs brownish-yellow, tips of tibiæ and bases of femora slightly brownish, but front tibiæ brownish on distal half; tarsi brownish, especially front tarsi, while the hind tibiæ and metatarsi are but little tinged with this colour. Wings fuscous-hyaline, costal cells and stigma distinctly yellow. Posterior cells all wide open, no stump nor even angle at the base of anterior branch of third vein. Eyes bare, no ocelli.

2. *Tabanus yucatanus*, n. sp.

Three ♀s. May 10th. Taken from horses, at the cenote of Xcolak, about ten miles southeast of Izamal, Yucatan. This is the first record of a Tabanid of any genus or species, so far as I can find, from Yucatan. Nor can I find any recorded from Campeche. I have searched through all the multitude of existing descriptions of *Tabanus* from North and South America, including Walker's and Bigot's numerous species, and have been unable to identify this and the preceding species with any of them.

Length, 10 to 11 mm. Differs from *campechianus* as follows: Palpi pale watery-yellowish. Gray bloom of face slightly tinged with

brownish. Front much narrower, about one-twelfth width of head, parallel portion fully five times as long as wide, just perceptibly narrowed anteriorly, with a callus swollen-conical or rounded posteriorly, prolonged into a second elongate spindle-shaped callus. Third antennal joint clearer reddish, annulate portion not so black; process more developed, ending in a sharp-pointed angle, basal part of joint rather widened and shortened; annulate portion short and comparatively stout, pointed elongate conical, hardly three times as long as basal width in two of the specimens, slightly longer and comparatively less stout in the other. Thorax saturate yellowish-brown, with four indistinct whitish lines, the middle ones sometimes obsolete. Scutellum concolorous with thorax. Median whitish vitta of abdomen formed of whitish pubescence in triangles, under which the ground colour is seen to be paler than the brownish-yellow of rest of abdomen. Pale brownish vitta on each side of median one is composed of coalescent oblique markings, like a vitta broken at the incisures, the marking on each segment directed posteriorly outward. A nearly similar, hardly less broken lateral whitish vitta outside of this on each side: the last is bounded by a broken brown vitta on edge of abdomen, serrate on inner edge. Fourth to seventh, especially fifth to seventh segments, more deeply tinged with brown, or quite dark brown in ground colour. White incisures on sides of abdomen. White vittæ and incisures white-hairy, brownish vittæ black-hairy. Front femora quite brownish, hind metatarsi well tinged with brown, front tarsi almost black. Wings uniformly clear, except the pale yellowish oblique elongate stigma. Otherwise as in *campechianus*, including the venation, bare eyes, and absence of ocelli.

A NEW METHOD OF STUDYING NEURATION.

BY HENRY SKINNER, PROF. ENT. ACAD. NAT. SCI., PHILADELPHIA, PA.

The opprobrium cast on the lepidopterist has been that he did not study the anatomy of his specimens, but depended too much on maculation and colour. There has been much truth in the reproach, as there are few of us who would destroy a rare or unique specimen to examine the neuration. Fortunately the time has arrived when the neuration can be studied with the greatest ease and accuracy, and permanently re-recorded in a photograph, or, more strictly speaking, a radiograph. The anatomy of a living chrysalis may be studied without removing the

cocoon, and also the internal anatomy of the thorax and abdomen can be fairly well seen, and in time the process may be improved for this work. With the aid of the Roentgen or X rays and the photographic plate one could make a picture of the neururation of the beautiful, rare and curiously shaped *Ornithoptera paradisea* and not disturb a scale on its superb wings. With the fluoroscope one could doubtless see all the neururation without even going to the trouble of making a picture. This is indeed a wonderful age, and in the future no entomologist will have any excuse for not studying the neururation of the lepidoptera, as he cannot say that he must denude the wings of his specimens, bleach them and mount in balsam as of old and thus destroy them.

BOOK NOTICES.

GUIDE TO THE GENERA AND CLASSIFICATION OF THE NORTH AMERICAN ORTHOPTERA. By S. H. Scudder: 8 vo., pp. 89. W. H. Wheeler; Cambridge, 1897. (Price \$1.00.)

The above work, like all of Dr. Scudder's books, is exactly what the title states. It is simply a guide for the use of students of the Orthoptera, by means of which they may determine the genera of their specimens. It consists of excellent and most carefully prepared tables of the seven families into which the Orthoptera of North America are divided. These are followed by most valuable bibliographical notes, in which the student is referred under the head of each family of insects to all the works which refer to it. Then follows a full list of all the works which refer to North American Orthoptera, arranged alphabetically by authors and a complete index. All who have attempted to study Orthoptera know how badly such a book was wanted, and it is well for the science of entomology that the work was done by such a careful and experienced hand. J. F.

THE GENERA OF NORTH AMERICAN MELANOPLI. By S. H. Scudder. (Proc. Am. Acad. of A. and S. V. 32, pp. 195-206. Jan., 1897)

Almost simultaneously with Dr. Scudder's "Guide to the Genera of Orthoptera" two other important and extremely useful papers appeared, one on "*The Genera of North American Melanopli*" and the other on "*The Species of the Genus Melanoplus*." These are both really advance issues of chapters in Dr. Scudder's great work on the *Melanopli*, which is to be published by the U. S. National Museum. The *Melanopli* are divided into 30 genera, 17 of which are new and 4 have been previously published by the author. The genus *Melanoplus* is characteristically American and is widely disseminated. There are 131 species recognized, grouped under 28 series. The name *furcula* is given to the processes of the last dorsal segment of the male abdomen. J. F.

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THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXVII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC. —(Continued.)

With this paper we begin the consideration of the Lamiinæ, the third great subfamily of Longhorns. They have recently been worked up by Mr. Leng and Dr. Hamilton in a joint publication* which has been largely used and followed in the preparation of the succeeding pages. The essential characters are to be found in the oblique sulcation of the outer side of the front tibiæ, the lack of prothoracic margin and the cylindrical pointed terminal joint of the palpi. None of the Canadian forms offer exceptions to the above rule. It will also be noticed that the front of the head is usually vertical instead of being oblique or nearly horizontal. Compare a *Prionus*, *Romaleum* and *Saperda* and this point will be made clear.

In order to construct a dichotomous table of the Canadian genera it has been necessary to disturb the sequence somewhat. The student will understand, however, that no implication of relationship is meant to be expressed in the succession as adopted in this paper, but convenience of identification has been given the most prominence. Probably the only characters that will be found difficult to a beginner are those relating to the claws (which, however, are sufficiently commented upon in the table), the antennal cicatrix and the front coxæ. The cicatrix is a sort of scar which is to be easily seen in *Monohammus* near the tip of the first antennal joint; it is, in the above genus, limited by a distinct raised line. The angulation of the front coxal cavities is readily noticeable in the same insect, especially if the leg be removed, when it is seen that the cavity, instead of being circular in outline, has a V-shaped nick in the outer margin.

It is, perhaps, hardly necessary to state so self-evident a fact as that the "Classification" of Drs. Leconte and Horn has furnished the chief

*The Lamiinæ of North America. Trans. Am. Ent. Soc., XXIII.

material for the table, which is in the main only a slight rearrangement of the numerous short ones of their own.

- Humeral angles not prominent, wings wanting. Form very convex, prothorax rounded, unarmed. Elytra with bands of pubescence *Ipochus*.
 Humeral angles usually distinct, wings and elytra fully developed, not abbreviated. 2.
2. Usually large or moderate-sized species; elytra not spinose at base. 4.
 Small or minute species. Elytra with a spine or gibbosity near the scutellum. 3.
3. Humeri rounded, elytra very convex and with large spine near scutellum *Crytinus*.
 Humeri distinct, elytra less convex, with oval gibbosity near scutellum *Psenocerus*.
4. Scape of antennæ with apical cicatrix. Nearly all large species, antennæ sometimes greatly elongate in the males. Prothorax with lateral spine present, often very large. 5.
 Scape of antennæ without apical cicatrix 6.
5. Legs long, anterior pair elongate in the males. *Monohammus*.
 Legs equal, not elongate *Goes*.
6. Front coxal cavities rounded. Body usually broad. Elytra attenuate behind. Antennæ usually very long in the males. 7.
 Front coxal cavities angulate 14.
7. Scape of antennæ club-shaped. Prothorax with dorsal tubercles and large, acute, nearly median lateral spine. *Acanthoderes*.
 Scape of antennæ nearly cylindrical. Lateral spine or tubercle, if present, behind the middle 8.
8. Female without elongated ovipositor. 9.
 Female with elongated ovipositor 12.
9. Prothorax fully tuberculate or angulate. Mesosternum broad. *Leptostylus*.
 Prothorax distinctly angulate, or more frequently with a short spine or acute tubercle behind the middle. Mesosternum narrow . . . 10.
10. Antennæ without traces of ciliæ beneath, first joint of hind tarsus as long as the next two. Prosternum narrow, body without erect hairs. *Liopus*.
 Antennæ distinctly ciliate beneath, first joint of hind tarsi as long as next three 11,

11. Elytra without lateral carina, usually with transverse angulated markings..... *Lepturges*.
Elytra with lateral carina and marked with numerous small black spots *Hyperplatys*.
12. Body above pubescent, without intermixed erect hairs ; antennæ with at least joints 3-4 densely fringed with hairs beneath...*Acanthocinus*.
Body above with erect hairs mixed with the pubescence 13.
13. Mesosternum broad, antennæ not much longer than the body and not ciliate beneath except feebly on the scape..... *Graphisurus*.
Mesosternum narrow, antennæ of male twice as long as the body, ciliate beneath *Ceratographis*.
14. Antennæ very elongate, prothorax cylindrical, slightly tubularly narrowed behind (in our species) without lateral armature or dorsal tubercles. Colour black.....*Dorcaschema*.
Antennæ not more than moderately elongate 15.
15. Claws (at least on front tarsi) divaricate ; *i. e.*, extending in a plane at right angles to the length of last tarsal joint... 17.
Claws divergent ; *i. e.*, not in plane as described above, but forming an angle 16.
16. Rather large species, prothorax sinuate or feebly tuberculate on sides, front of head large, flat. Shape *Saperda*-like. Claws simple..... *Oncideres*.
Rather small species. Black, front of head in part and sides of prothorax yellow, claws cleft *Amphionycha*.
17. Claws simple (except outer one of front and middle tarsi in some male *Saperda*) 18.
Claws cleft or appendiculate.... 22.
18. Smaller species, prothorax spinose or tuberculate on sides. 19.
Larger species, prothorax never armed nor tuberculate *Saperda*.
19. Thighs clavate, vertex concave, antennal tubercles prominent.... 20.
Thighs not clavate, vertex flat or convex, antennal tubercles not prominent. Eyes coarsely granulated, lower lobe as wide as long, body with flying hairs, antennæ pilose, joints 5-10 shorter, equal *Eupogonius*.
20. Lower lobe of eyes elongate. Lateral spines of prothorax large, median. Pubescence mottled, gray and black, mixed with short, scattered hairs on elytra.....*Hoplosia*.
Lower lobe of eyes subquadrate or subtriangular 21.

21. Prothorax with lateral spine, flying hairs long *Pogonocherus*.
 Prothorax with feebly rounded sides, pubescence short *Ecyrus*.
 22. Eyes not divided, prothorax not distinctly tuberculate, form
 slender *Oberrea*.
 Eyes completely divided, the upper and lower portions widely separated,
 prothorax with large lateral tubercle, form stout. Colour
 red with black spots *Tetraopes*.

IPOCHUS, Lec.

A record of the Californian species *I. fasciatus*, Lec., is existent upon the Society's list, but I am unaware of the original authority. It is a convex, heavily-built beetle, blackish, pubescence long, erect. Prothorax with large punctures, and bearing a transverse row of four spots of white pubescence. Elytra with irregular transverse bands of whitish pubescence, varying in width. Length, .18-.30 inch.

CYRTINUS, Lec.

Represented by one extremely small, somewhat antlike species, *C. pygmaeus*, Hald., easily recognized by the convex elytra with rounded humeri and large juxta-scutellar spine. Colour nearly black, elytra with a whitish pubescent spot before the middle, antennæ annulate. Length, .08-.12 inch. Said to occur on dead oak branches.

PSENO CERUS, Lec.

P. supernotatus, Say (fig. 30), is recorded as boring during larval life in the stems of grape, currant, gooseberry, and apple. I have frequently beaten it from crab-apple trees. It is a small beetle of somewhat elongate form, reddish to nearly black, the elytra with a darker blotch behind the middle which is bordered anteriorly and posteriorly by a band of whitish pubescence, the anterior band usually much the narrower and interrupted near the suture. Antennæ shorter than body in both sexes. Small specimens are often almost entirely black, and may lack the elevation at the base of the elytra. Length, .12-.24 inch.

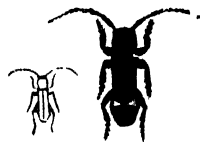


FIG. 30.

MONOHAMMUS, Serv.

Includes several very large species with long legs and antennæ, especially in the males. Some or all of them are injurious to pine lumber, and *scutellatus* and *confusor* are usually abundant in the eastern

coniferous forests. *M. maculosus* is more essentially western, but often common, while *marmorator* is very rare. Dr. Horn separates the species thus :

A. Tips of elytra rounded, sutural angle acute or spiniform, especially in the male. Piceous or black, more or less bronzed, elytra irregularly mottled with patches of brownish and grayish or whitish pubescence. Punctuation very coarse and close. .66–1.06 inch *maculosus*, Hald.

AA. Tips of elytra rounded, sutural angle not prolonged, usually very obtuse.

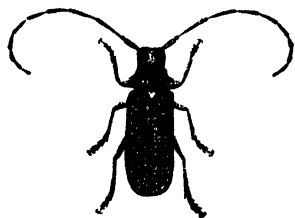


FIG. 31.

b. Black, distinctly bronzed. Elytral patches of pubescence few or wanting; female antennæ annulate. Scutellum densely clothed with white pubescence. .64–1.24 inch. (fig. 31). *scutellatus*, Say.

bb. Brown, elytra sparsely mottled with patches of gray and brown pubescence. Female antennæ not annulate. 1.10–1.24 inch. (fig. 32) .. *confusor*, Kirby.

AAA. Tips of elytra obliquely prolonged and acute. Elytra brownish, surface feebly punctured, clothed with ochreous white and brown patches intermixed. 1.00 inch.... *marmorator*, Kirby.

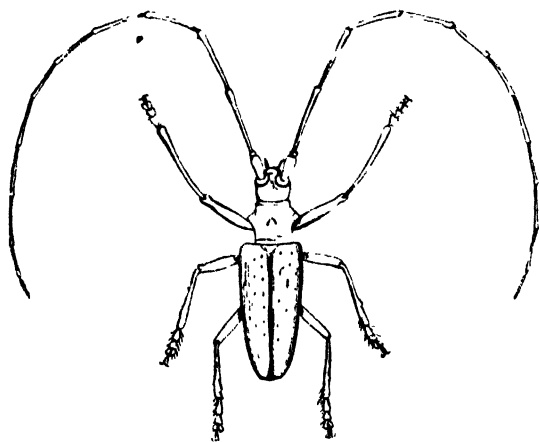


FIG. 32 (after Harris).

GOES, Lec.

Contains several species, mostly of rather or quite large size, resembling *Saperda* somewhat in form, but with a strong lateral thoracic spine. All have the upper surface mottled with pubescence, sometimes arranged in tolerably distinct transverse bands. Since only one of the North American species is lacking from Canada, we reproduce Dr. Horn's synopsis as far as it concerns us :

- A. Surface colour of body brownish ; antennæ of male at most one and one-quarter times the length of the body.
 - b. Elytra with conspicuous denuded fascia one-third from apex.
 - Pubescence of surface white. 1.00 in *tigrina*, DeG.
 - Pubescence ochreous or luteous, basal region of elytra darker, less pubescent. .92 in *pulchra*, Hald.
 - Pubescence marmorate, whitish and ochreous, the apical region darker ochreous. .44-.52 in *debilis*, Lec.
 - bb. Elytra without conspicuous denuded fascia, pubescence cinereous or almost white, uniform, sometimes with faint trace of denuded fascia. .80-.88 in *pulverulenta*, Hald.
- AA. Surface colour black, shining, pubescence whitish, a small conspicuous black spot on each elytron, one-third from apex. Antennæ of male twice as long as the body. .40-.44 in *oculata*, Lec.

A few notes on food-habits have been published, from which it appears that *debilis* has been found on hickory and white oak, *tigrina* on hickory (as an adult) and in oak (as larva); *pulchra* and *oculata* are found in the mature stage on hickory, while the larva of *pulverulenta* is said to bore in wild cherry and in living beech trees.

ACANTHODERES, Serv.

The three species belonging here may be separated from those immediately following by their antennæ, in which the first joint, or scape, is strongly clavate. They are brownish insects, maculate above with whitish or ashy pubescence, of rather robust form, the upper surface rough, the femora much swollen. Prothorax with strong, sharp lateral spine. The differentials are given by Dr. Horn, thus :

- A. Sutural region of elytra vaguely grooved, the groove limited on each elytron by a feeble costa. Elytra with a moderately broad transverse band of white in front of middle, broadly interrupted at suture. .40 in *quadrigibbus*, Say.

AA. Sutural region not grooved, elytra with a more or less distinct M-shaped black mark behind the middle of each.

Base of elytra irregular, an oblong obtuse umbone at middle of base. .42-.48 in.....*decipiens*, Hald.

Base of elytra regularly convex without umbone. .80 in.....*Morrisii*, Uhler.

The recorded food-plants of *A. quadrigibbus* are oak, hickory, beech, and hackberry. I have found *A. decipiens* on oak logs, but am unaware of the larval habits.

LEPTOSTYLUS, LEC.

Numerous species are known from Canada, and are arranged mainly on the plan offered by Dr. Horn. The name *commixtus* is replaced by *sexguttatus*. The lateral tubercle of the prothorax is always blunt, sometimes obsolete.

A. Elytra without asperities and scalelike hairs.

Prosternum between the coxæ as wide as a coxal cavity, elytra slightly truncate at tip. Robust, convex, prothorax with whitish pubescence forming a broad lateral stripe each side, bounded internally by a black stripe which is formed of a row of denuded tubercles, the discal area brownish. Elytra with a broad irregular transverse post-median area of whitish pubescence. .16-.36 in.....*macula*, Say.

Prosternum narrower than a coxal cavity, tips of elytra separately rounded, thorax moderately densely punctured on flanks as well as disk. Yellowish or reddish brown, elytral surface uneven, basal angles black, polished; a dark brown irregular band often extends backward from these angles to the middle, thence narrows towards suture, followed posteriorly by one or two black spots, but these markings may be absent. Three large basal tubercles on prothorax, and three smaller, sometimes obsolete, subapical ones. .40 in.....*collaris*, Hald.

AA. Elytra with asperities or tubercles, bearing at their summits short black scalelike hairs.

b. Thorax densely punctured, elytra with densely placed coarse deep punctures. Colour variable, elytra mottled with grayish pubescence. .28-.40 in.....*sexguttatus*, Say.

bb. Thorax not densely punctured, elytral punctures not closely placed, often inconspicuous or concealed. Legs not hairy.

- c. Antennæ longer than the body in both sexes, the third joint only slightly longer than the fourth. Punctuation of thorax regular.

Elytra very indistinctly punctured, especially at apex, the disk with angulate fascia behind the middle, tips feebly obliquely truncate. .16-.24 in. *biustus*, Lec.

Elytra distinctly punctured over entire surface, disk with acutely angulated fascia, apex slightly prolonged, not obliquely truncate. .16-.24 in. *parvus*, Lec.

- cc. Antennæ scarcely longer than the body even in the male, the third joint conspicuously longer than the fourth. Robust, brownish, surface of prothorax roughly tuberculate, pubescent, punctures sparse, irregularly placed. Elytra with raised tubercles or ridges, and with grayish and whitish pubescence which tends to form a post-median transverse band broadest at the suture, the pubescence becoming darker anteriorly. Tip dark. .32-.40 in. (fig. 33) *aculifer*, Say.



FIG. 33.

The food plants of several of the above are recorded. *L. maculata* is known to breed in beech, hickory, walnut, butternut, and chestnut; *sexguttatus* in pine; and *aculifer* in oak, apple, sycamore, and osage orange.

RARE BUTTERFLIES.—On the 8th day of May, Mr. James Walker captured, in a cedar swamp, near Orillia, Ont., a specimen of *Thecla tata*, Edw. This butterfly has hitherto only been recorded in Canada, from London and York Mills in this Province, and from a few localities in the Province of Quebec.

Mr. C. E. Grant, of Orillia, has recently taken a specimen of the melanic form of *Colias philodice*, the yellow on the wings being replaced by dark scales. It is apparently somewhat similar to the aberration recorded by Mr. Dwight Brainerd (C. E., XXVIII, p. 305), which he took at Edgartown, Mass., last year. Mr. Grant has also taken at Orillia, for the first time, *Papilio troilus* and *Lycana comyntas*, making the total number of butterflies from that locality sixty-two.

Papilio Ajax (a perfect specimen) has again been seen at Port Hope on the 24th of July.

A GENERIC REVISION OF THE HIPOCRITIDÆ (ARCTIIDÆ).

BY HARRISON G. DYAR, PH. D., NEW YORK.

The earliest use of the term Arctiidæ is referred by Dr. Packard to Leach (1815). This is antedated by Hubner's Tentamen terms, Hipocritæ and Hypercompæ. The latter is unavailable, as Hypercompa becomes a synonym. I do not find any plural terms for the family before Hubner.

The faunas of Europe and America are here united. I have included the Indian genera as far as possible, but could not do so completely, as Hampson's work is much less available here than usual. Hampson does not recognize the Lithosiidæ on the character of the absence of ocelli, but unites under the term Arctiidæ all the species here grouped as Hipocritidæ with Lithosiidæ, Nyctemeridæ, Pseudoipsidæ and Nolidæ. His subdivisions of this aggregation are based on other characters, so that some of the genera that I have not seen can not be placed in the table from his figures and descriptions. Especially *Castalba*, *Tatargena*, *Sidymanis* may be Hipocritidæ, though placed in Hampson's Lithosiinæ, while *Rhodogastria*, *Pangora*, *Nicæa* and *Leucopardus* I can not place from lack of the type species. I do not think that this affects the present revision, as these genera seem to be distinct from any of those included. As far as the American genera are concerned, I exclude *Cydosis* and *Cerathosis*, as they are probably Noctuid. *Euverna* is transposed to the Arctiinæ and becomes synonymous with *Ectypia*, a result due to the study of additional material, which I owe to Prof. Smith. *Cycnia* divides into three genera on venational characters, one of the sections 'supplanting *Pareuchaetes*; *Halisidota* divides into two genera. The names *Elpis* and *Neoarctia* fall before European terms and a new genus is required for the species *virginalis*, Boisd. *Pygoctnucha* is transferred from the *Euchromiidæ* on account of the presence of vein 8 of secondaries. Three genera, *Eucereon*, *Bertholdia* and *Euerythra*, lack vein 8 and would seem strictly to be *Euchromiidæ*, but I hesitate to transfer them, as the habitus is Arctian, the larvæ are unknown and the condition of vein 8 is distinctly led up to in *Eupseudosoma*, which has a short spurlike vein 8 in the male and none in the female. The *Phaegopterinae* may be further modified when the large South American fauna is worked up. In the meantime I dedicate to Mr. Schaus the new section of *Halisidota*, which he has shown to be of generic value (Journ. N. Y. Ent. Soc., IV., 138) in recognition of his work on this group as well as on the allied *Euchromiidæ* and in the anticipation of still further and more comprehensive labours.

The following table is based on the work of Prof. J. B. Smith, which appeared in CAN. ENT. some years ago, and was worked over in the revision of Bombyces by Mr. Neumögen and myself. Following the table is a list of genera and species; italicized names are North American. Bibliographical references are omitted, and they can readily be found in Kirby's catalogue if wanted. The types of genera are recognized as determined by Kirby.

KEY TO THE GENERA.

1. Head prominent, tongue moderate or strong 2.
 Head more or less retracted, tongue weak or small. 13.
2. Secondaries large and ample, habitus lithosiiform 3.
 Secondaries trigonate, often small, primaries pointed at apex 44.
3. Vein 5 of secondaries faint or absent. 4.
 Vein 5 distinct 5.
4. Primaries long and narrow *Coscinia*.
 Primaries broad, trigonate *Eubaphe*.
5. Primaries broad, trigonate 6.
 Primaries narrow, apices rounded *Utetheisa*.
6. Vein 5 of secondaries arising close to vein 4 7.
 Vein 5 of secondaries from near the middle of the cell *Doa*.
7. No accessory cell; veins 7 to 10 of primaries stalked 10.
 No accessory cell; vein 10 free, from the discal cell *Axiopana*.
 Accessory cell present, vein 10 arising from it 8.
8. Anal angle of secondaries rounded in the male, spurs of tibiæ long.. 9.
 Anal angle produced to a point; spurs very short *Argina*.
9. Vein 6 arising beyond the angle of the discal cell. *Macrobrochis*.
 Vein 6 arising from the discal cell *Callimorpha*.
10. Vein 11 free from vein 10 11.
 Vein 11 almost or quite touching vein 10. 12.
11. Secondaries over three-fourths the length of primaries *Haploa*.
 Secondaries less than three-fourths the length of primaries. *Areas*.
12. Secondaries with veins 6 and 7 from the cell. *Sebastia*.
 Secondaries with veins 6 and 7 stalked *Calpenia*.
13. Vein 8 of secondaries wanting. *Euerythra*.
 Vein 8 present. 14.
14. Veins 7 to 10 of primaries stalked from apex of cell. 15.
 Vein 10 arising from the discal cell. 38.
15. Vein 11 free 16.
 Vein 11 joined to vein 10 to form an accessory cell. *Hipocrita*.

16. Median spurs of hind tibiæ wanting 17.
 Median spurs of hind tibiæ present 26.
17. Anterior tibiæ unarmed 18.
 Anterior tibiæ armed at tip 20.
18. Antennæ of male simple 19.
 Antennæ of male pectinated *Leptarctia*.
19. Palpi exceeding the front *Ecpantheria*.
 Palpi not reaching the front *Cretonotus*.
20. Inner prong of tibial armour-plate produced into a spine 21.
 Inner prong not much produced, spine short 24.
21. Wings of male with the outer margin upright, of female
 aborted *Pachylischia*.
 Wings narrow, outer margin somewhat oblique 22.
22. Costa of primaries convex *Seirarctia*.
 Costa of primaries straight 23.
23. Robust, with hairy vestiture, blackish *Alexicles*.
 Slenderer, the vestiture smooth, white *Aloa*.
24. Male and female antennæ simple *Phissama*.
 Male antennæ pectinated, female simple... 25.
 Male and female antennæ pectinated *Estigmene*.
25. Wings with short erect scales, slightly transparent *Diaphora*.
 Wings with appressed scales, not transparent. *Hyphantria*.
26. Antennæ of male simple 27.
 Antennæ of male pectinated 30.
27. Vestiture of thorax scaly, appressed 28.
 Vestiture hairy, smooth *Pericallia*.
 Vestiture hairy, short, erect 29.
28. Wings broadly trigonate *Camptoloma*.
 Wings elongate, more rounded *Arachnis*.
29. Apex of primaries acuminate. *Pyrrharctia*.
 Apex of primaries square *Phragmatobia*.
30. Ocelli close to margin of eye (about the diameter of the ocellus) . 31.
 Ocelli distant from the margin of the eye. 36.
31. Primaries broad, outer margin somewhat erect 32.
 Primaries narrower, outer margin somewhat oblique *Alpheæ*.
32. Body slender, secondaries ample *Diacrisia*.
 Body more robust, secondaries moderate. 33.
33. Female wingless *Ocnogyna*.
 Female with fully-developed wings 34.

34. Costa of primaries not depressed before apex 35.
 Costa of primaries depressed before apex.....*Rhyparia*.
35. Wings opaque.....*Spilosoma*.
 Wings somewhat translucent*Thygorina*.
36. Front narrowed above and below*Arctinia*.
 Front square, not narrowed 37.
37. Rough hairy, wings subdiaphanous.....*Eucharia*.
 Somewhat smooth, wings opaque*Hyphoraia*.
38. Accessory cell wanting 39.
 Accessory cell present..... 40.
39. Wings broad, size large, vestiture smooth and short....*Platyprepia*.
 Wings moderate, size smaller, vestiture rough*Euprepia*.
 Wings elongate, size very small.....*Kodiosoma*.
40. Spurs of posterior tibiæ long or moderate..... 41.
 Spurs of posterior tibiæ short*Ectypia*.
 Median spurs of posterior tibiæ wanting*Ammobiota*.
41. Size small, body rather slender 42.
 Size large, body more robust 43.
42. Wings short and broad.....*Parasemia*.
 Wings long and narrow*Pygoctnucha*.
43. Wings broad*Arctia*.
 Wings narrow.....*Antarctia*.
44. Vein 8 of secondaries absent. 52.
 Vein 8 present 45.
45. Veins 7 to 10 of primaries stalked.....*Cycnia*.
 Vein 10 from the discal cell 46.
46. Accessory cell present 47.
 Accessory cell absent 48.
47. Antennæ long, secondaries proportionately small.....*Theages*.
 Antennæ shorter, secondaries larger.....*Pygarctia*.
48. Primaries broad, secondaries proportionate*Euchates*.
 Primaries narrow, produced at apex, secondaries smaller..... 49.
49. Male antennæ simple*Pelochyta*.
 Male antennæ pectinate 50.
50. Vein 8 of secondaries double*Schausia*.
 Vein 8 long, single*Halisidota*.
 Vein 8 very short, spurlike..... 51.
51. Vein 5 of secondaries present.....*Aemilia*.
 Vein 5 of secondaries wanting.....*Eupsudosoma*.

52. Vein 10 of primaries from the discal cell *Eucereon*.
 Veins 7 to 10 of primaries stalked *Bertholdia*.

LIST OF GENERA AND SPECIES.

- Coscinia*, Hübn. (= *Eulepia*, Curt. = *Emydia*, Boisd.)
striata, Linn.
cribraria, Linn.
Eubaphe, Hübn. (= *Crocota*, Hübn. = *Holomelina*, H. S.)
laeta, Guér.
intermedia, Graef.
ostenta, H. Edw.
costata, Str.
opella, Grt.
immaculata, Reak.
aurantiaca, Hübn.
Utetheisa, Hübn. (= *Deiopeia*, Steph.)
bella, Linn.
venusta, Dalm.
ornatrix, Linn.
pulchella, Linn.
formosa, Boisd.
Doa, Neum. & Dyar.
ampla, Grt.
dora, N. & D.
Axiopoetra, Ménét.
maura, Eichw.
Macrobrochis, H.-S.
gigas, Walk.
Callimorpha, Latr. (*Euplagia*, Hb. = *Tripura*, Moore.)
dominula, Linn.
quadripunctaria, Poda.
prasena, Moore.
pallens, Hamps.
principalis, Koll.
similis, Moore.
plagiata, Walk.
equitalis, Koll.
nyctemerata, Moore.
Argina, Hubn.
argus, Koll.
syringa, Cram.
cribraris, Clerck.
Haploa, Hubn.
clymene, Brown.
colona, Hubn.
Lecontei, Guer.
contigua, Walk.
confusa, Lyman.
Areas, Walk. (= *Melanareas*, Butl.)
galactina, Van d. Hoef.
imperialis, Koll.
Sebastia, Kirby (= *Moorea*, Hamps.)
argus, Walk.
Calpenia, Moore.
khasiara, Moore.
Saundersi, Moore.
Euerythra, Harvey.
phasma, Harv.
trimaculata, Smith.
Hipocrita, Hübn. (= *Euchelia*, Boisd.)
jacobææ, Linn.
Creatonotus, Hubn.
interruptus, Gemel.
Ecpantheria, Hubn.
garsoni, Oberth.
ocularia, Fab.
permaculata, Pack.
Leptarctia, Stretch.
californiæ, Walk.

- Pachylischia*, Ramb. (= *Artimelia*, Ramb.)
 corsica, Ramb.
 Latreillei, Godt.
Seirarctia, Packard.
 echo, Sm. & Abb.
Alexicles, Grote.
 aspersa, Grt.
Aloa, Walk. (= *Bucæa*, Walk.)
 emittens, Walk.
 simplex, Walk.
 fumipennis, Hamps.
Phissama, Moore (= *Amphissa*, Walk.)
 transiens, Walk.
Estigmene, Hubn. (= *Leucarctia*, Pack.)
 acraea, Drury.
 Rickseckeri, Behr.
 albida, Stretch.
Diaphora, Stephens.
 mendica, Clerck.
Hyphantria, Harris.
 cunea, Dru.
Camptoloma, Felder.
 interioratum, Walk.
 binotatum, Butler.
Arachnis, Geyer.
 aulea, Geyer.
 picta, Pack.
 maia, Ottolengui.
 citra, N. & D.
 zuni, Neum.
Pericallia, Hübn.
 matronula, Linn.
Pyrrharctia, Packard.
 isabella, Sm. & Abb.
- Phragmatobia*, Steph.
 fuliginosa, Linn.
 assimilans, Walk.
Rhypharia, Hübn.
 purpurata, Linn.
Diacrisia, Hübn. (= *Euthemona*, Steph.)
 sannio, Linn.
Ocnogyna, Lederer (= *Cletis*, Ramb. = *Somatrichia*, Kirb.).
 zoraida, Grasl.
 maculosa, Herm.
 parasita, Hübn.
Spilosoma, Steph. (= *Spilarctia*, Butl.)
 urticæ, Esp.
 lubricipeda, Linn.
 punctarium, Stoll.
 lutea, Hufn.
 virginica, Fab.
 prima, Slosson.
 antigone, Strecker.
 latipennis, Stretch.
 vestalis, Pack.
 multiguttum, Walk.
 sangaicum, Walk.
 subfascia, Walk.
 dalbergiæ, Moore.
 punctatum, Moore.
 dentilinea, Moore.
 stigmata, Moore.
 mona, Swinhoe.
 gopara, Moore.
 ummera, Swinhoe.
 bimaculatum, Moore.
 jucundum, Butler.
 flavale, Moore.
 todarum, Moore.
 montanum, Guer.

- strigulatum, Walk.
 castaneum, Hamps.
 rubilinea, Moore.
 erythrophelps, Hamps.
 brunneum, Moore.
 casignetum, Koll.
 bifasciatum, Hamps.
 comma, Walk.
 lacteatum, Butl.
 melanopsis, Walk.
 rubitinctum, Moore.
 erythrozona, Koll.
 fuscipenne, Hamps.
Thygorina, Walker.*
 indica, Guer.
 multivittata, Moore.
 nigrifrons, Walk.
 unifascia, Walk.
 discalis, Moore.
 obliquivitta, Moore.
 venosa, Moore.
 flavens, Moore.
 biseriata, Moore.
 sordida, Moore.
 sikkimensis, Moore.
 eximia, Swinhoe.
 rhodophila, Walk.
 melanosoma, Hamps.
Alphæa, Walker.*
 fulvohirta, Walk.
 florescens, Moore.
 imbuta, Walk.
 quadriramosa, Koll.
 tigrina, Moore.
 leopardina, Moore.
 vittata, Moore.
 biguttata, Walk.
 nigricans, Moore.
 dentata, Walk.
 pannosa, Moore.
 siaphi, Moore.
Arctinia, Eichw. (= Elpis, Dyar. =
 Eupatolinis, Butl.)
 cæsarea, Gwze.
 rubra, Neumcegen.
 vagans, Boisd.
Eucharia, Hubn. (= Neoarctia, N.
 & D.)
 casta, Esper.
 Brucei, H. Edw.
 Beanii, Neum.
Hyphoraia, Hubn. (= Platarctia,
 Pack.)
 aulica, Linn.
 hyperborea, Curt.
 Yarrowi, Stretch.
Platyrepia, Dyar.
 virginalis, Boisd.
Euprepia, Ochsenheimer*
 pudica, Esp.
 fasciata, Esp.
 intercalaris, Evers.
 virgo, Linn.
 virguncula, Kirby.
 michabo, Grt.
 intermedia, Stretch.
 parthenice, Kirby.
 rectilinea, French.
 anna, Grote.
 ornata, Pack.
 arge, Dru.
 Quenselii, Paykull.
 obliterata, Stretch.
 proxima, Guer.

*See Hampson for the generic synonymy.

- cervinoides*, Streck.
Bolanderi, Stretch.
Blakei, Grote.
superba, Stretch.
favorita, Neum.
Williamsii, Dodge.
phyllira, Dru.
figurata, Dru.
placentia, Sm. & Abb.
nais, Dru.
phalerata, Harris.
vittata, Fab.
Kodiosoma, Stretch.
fulvum, Stretch.
Ectypia, Clemens (= *Euverna*,
N. & D.).
bivittata, Clemens.
clio, Packard.
Ammobiota, Wallengren.
festiva, Hufn.
Parasemia, Stephens.†
plantaginis, Linn.
petrosa, Walk.
Pygoctnucha, Grote.
Harrisii, Boisd.
terminalis, Walk.
Robinsonii, Boisd.
funerea, Grote.
Arctia, Schrank (= *Epicallia*, Hbn.
= *Hypercompa*, Hbn.
= *Zoote*, Hübn.)
villica, Linn.
caja, Linn.
opulenta, H. Edw.
Antarctia, Hubner.
vulpina, Hubn.
- Cyenia*, Hübn. (= *Tadana*, Walk. =
Pareuchætes, Grt.)
tenera, Hübn.
sciurus, Boisd.
insulata, Walk.
Pygarctia, Grote.
abdominalis, Grote.
vivida, Grote.
murina, Stretch.
Bolteri, H. Edw.
elegans, Stretch.
scepsiformis, Graef.
albicosta, Walk.
Euchætes, Harris.
egle, Dru.
eglenensis, Clemens.
oregonensis, Stretch.
perlevis, Grote.
Spraguei, Grote.
sonalis, Grote.
Pelochyta, Hübn. (= *Amerila*, Walk.)
astræa, Dru.
Halisidota, Hübn. (= *Lophocampa*,
H. = *Euhalisidota*, Grt.)
tessellaris, Sm. & Abb.
Harrisii, Walsh.
cinctipes, Grote.
Edwardsii, Pack.
labecula, Grote.
maculata, Harris.
alni, H. Edw.
Agassizii, Pack.
minima, Neum.
caryæ, Harris.
pura, Neum.
longa, Grt.
propinqua, H. Edw.

†See Neumegeu and Dyar for the generic synonymy.

bicolor, Walk.	albigutta, Boisd.
Courregesi, Dognin.	lugens, Hy. Edw.
atra, Druce.	<i>Aemilia</i> , Kirby.
daruba, Druce.	<i>roseata</i> , Walk.
ergana, Druce.	<i>occidentalis</i> , French.
aconia, H.-S.	<i>Eupseudosoma</i> , Grote.
thalassina, H.-S.	<i>floridum</i> , Grote.
<i>Schausia</i> , Dyar.	<i>Eucereon</i> , Hubn.
<i>argentata</i> , Pack.	<i>carolinum</i> , Hy. Edw.
<i>subalpina</i> , French.	<i>Theages</i> , Walker. ^o
<i>sobrina</i> , Stretch.	<i>strigosa</i> , Walk.
<i>mixta</i> , Neum.	<i>Bertholdia</i> , Schaus.
<i>ingens</i> , Hy. Edw.	specularis, H. S.
<i>ambigua</i> , Strecker.	<i>trigona</i> , Grote.

LARVA OF TITANIO HELIANTHIALES, MURTFELDT.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Miss Murtfeldt's interesting discovery of this leaf-mining Pyralid suggested to me the inquiry as to how far the setæ of the larva had been affected by this unusual habit. The leaf-mining Tineids have tubercles iv. and v. remote, while all the Pyralids that I have seen have these tubercles united. I was interested to learn how far fixed this Pyralid character is, especially as the setæ have been studied in but a few microlepidoptera.

Miss Murtfeldt very kindly sent me her alcoholic specimens. The larva has the flattened retracted head and large cervical shield of a leaf-miner, but the body is not flattened and the slender legs are normal. The setæ are perfectly normal for the Pyralidæ, iv. and v. closely united. There is also the little additional tubercle before and above the spiracle, which is present in other Pyralids and also in the Cossidæ. In fact, the larva strongly suggests a little Cossid, except that the feet are longer and the circle of crotchets is broken on the outside. The pupa tells a different story. It might belong to the Pyraloid Obtectæ, which Dr. Chapman says have obtect characters in practically all respects except the possession

||In the male type vein 10 of primaries arises from the apex of discal cell on one wing, distinctly stalked on the other wing, but with a basally directed spur, indicating an accessory cell. On secondaries the supplementary vein preceding vein 8 is very short.

^oType of *Theages* not examined. The characters in the table are those of our species.

of traces of maxillary palpi ; but I can only find with difficulty a slight trace of the maxillary palpi. This would make it almost a true obtect pupa, which is far removed from the Cossidæ.

The following descriptions contain some details not specially mentioned in Miss Murtfeldt's article :

Larva.—Head rounded, flattened, small, partly retracted ; clypeal sutures depressed, upper segment of labium forming a ridge ; dark brown, blackish on the narrow lateral angle ; width, 1.3 mm. Body segments distinct, creased several times in the incisures but not distinctly annulated, joint 13 divided. Cervical shield large, bisected, irregularly marked in black. Setæ distinct, from rather large, flat dark tubercles ; i. and ii. in trapezoidal form, iii. lateral, iv. and v. from a single substigmal tubercle, vi. posteriorly, vii. above the base of the leg with three setæ, viii. single ; a small secondary tubercle with one little seta before the upper part of the spiracle. On the thorax normal, the setæ of i. and ii. united in pairs, iv. and v. united, vi. with one seta on joints 3 and 4. Thoracic feet well developed, armed with setæ and claw. Abdominal feet distinct, rather slender ; crotchets in a narrow ellipse, broken on the outer side, a single row, but doubly clawed, a slight hook on the outside as well as the more distinct one on the inside, both small.

Pupa.—Smooth, obtect, thickest through the second abdominal segment, slightly tapering each way, rounded, the head a little projecting. Anal end rounded, cremaster without projection, but with four rather long, stout, recurved hooks. Fifth and sixth abdominal segments moveable. Cases reaching to the end of the fourth segment ; eye covered by a single piece, separated below by the small, lanceolate labium ; maxillæ reaching about one-third the length of the cases, a small piece indistinctly segmented off at the base next to the labium ; first leg reaching two-thirds the length of the cases, enclosing a small elliptical piece of its basal part next to the maxilla ; second leg reaching to the tip of the cases, apparently touching the eye, but on careful focusing a small piece seems to be cut off at the base, which I take to represent the maxillary palpus ; antennæ not attaining the extremity of either the second legs or the wing cases ; third legs concealed. The spiracle on the first segment is concealed by a projection of the hind wing case which extends to segment 3. Light yellowish-brown, all the sutures narrowly and distinctly marked in dark brown. Smooth, shining, no distinct punctures or wrinkles of any kind. Length, 6.5 mm. ; width, 2.5 mm.

GRAPTA INTERROGATIONIS, ETC.

This insect is not by any means abundant in my neighbourhood, and for several years I only captured one or two of the pale variety *Fabricii*. About four or five years ago I saw a worn female of that variety depositing eggs upon a wild hop I had trained over the front of my house. I did not subsequently see any other female near the plant. I left the larvæ upon it until they were nearly full grown, when I collected about a dozen. I think they all hatched out safely, and the result was about one-third of the dark form *Umbrosa* to about two-thirds of the pale. The larvæ were all of a size, and pupated within a day or two of each other, so I think it reasonable to suppose they were all from the eggs I saw being deposited, and from one and the same mother. Never having before seen or taken the dark form, and not then having any book upon Canadian butterflies, I was rather surprised at the result. On looking over my notes for last year I do not see anything of special interest, except that I took a specimen of *Chionobas varuna* on 21st June, and the only one that I saw. The occurrence here of *Colias casonia* has already been noted.

Owing to a conversation I had some time ago with Dr. Fletcher, I paid particular attention to *Colias eurytheme* and its varieties. I did not detect a single instance of *Eriphyle* "in coitu," or even flirting with other than its own female, though there were many flying about of the early small yellow form of *Eurytheme* and also of *Keewaydin*, nor vice versa.

Neither did I notice any intercourse between *Eriphyle* and the large orange form *Amphidusa*, Scudder, but the males of each variety seemed to single out the corresponding females of that variety. I am aware I am venturing upon dangerous ground, but so far as I am able to judge from observation, I should certainly say that *Eriphyle* was a species distinct from *Eurytheme*. Unfortunately, I am unable to give the time required to the rearing of the large number of larvæ necessary to the determination of this question. What I want particularly to convey is that I have never noticed promiscuous intercourse between the different broods, if such they are, though they overlap each other, and are flying at the same time.

E. FIRMSTONE HEATH,

Cartwright, Manitoba.

"The Hermitage."

A RARE CATOCALA.

BY ARTHUR J. SNYDER, EVANSTON, ILL.

Early last July, while examining the collection of Prof. G. H. French at Carbondale, Ill., I saw for the first time a specimen of *Catocala Sappho*. Being especially interested in this genus of the Noctuids, I was somewhat surprised to see for the first time so striking a species, and felt sure that I would have no difficulty in recognizing the species should I ever see another example.

On July 6th, near Makanda, Ill., I began a search for *Catocala*. From the first hickory I "whipped," a *C. Sappho* started and lighted upon a white oak near by, but about fifteen feet from the ground. Through the aid of a fence rail placed against the tree, and by using the net, I easily captured my first *C. Sappho*, a perfect specimen, with the exception that a few scales were removed from the thorax. July 14th I was collecting four miles south of Makanda and captured two more *C. Sappho*, one in fair condition and one a badly worn example. Another in very poor condition was taken on July 13th. Two others were seen and captured, but allowed to escape through sheer anxiety not to injure them. It may be interesting to collectors to know that this rare moth is one of the slowest flyers in the genus, and is easily captured. It usually lights low, and is not easily frightened. On account of its light colour it is quite conspicuous. In all seven *C. Sappho* were seen in the vicinity of Makanda, Ill., in four days' collecting. It has been my pleasure to examine 78 or more of the species and varieties of North American *Catocalæ*, but I have seen nothing which approaches *C. Sappho* closely enough to be confusing even to an amateur.

THE NEW MEXICO SPECIES OF ANTHIDIUM.

BY T. D. A. COCKERELL, MESILLA, N. M.

The bee-genus *Anthidium* is not very well represented in New Mexico, the following being all yet observed.

(1.) *Anthidium larreae*, n. sp.—♀. Length about $12\frac{1}{2}$ mm., fairly stout, but the abdomen not subglobose; black, with yellow markings, those of the thorax recalling *Steniolia duplicata*. Head large, face nearly square, moderately shining, closely punctured, sides of vertex with punctures of unequal size; end of mandibles not developed into distinct teeth. Antennæ short, black. Clypeus, broad triangle above, and lateral face marks, bright yellow; the last occupy all the space be-

tween clypeus and eyes, narrowing obliquely upwards so as to form nearly a right-angled triangle, continuing narrowly a little way along the orbital margin, then enlarging near the top of the eyes to a mark which points inwards towards the ocelli. Cheeks yellow, the yellow continuing across vertex as a narrow line. Mandibles yellow except ends. White pubescence rather sparse on face and cheeks; also on thorax, becoming dense on lower part of pleura. Tubercles, sides of thorax except a black patch on lower part of pleura, tegulæ except a pair of fuscous spots (one much larger than the other), sides of mesothorax broadly, extending along the front some distance to an oblique truncation, two longitudinal stripes on mesothorax, and scutellum except median base, all bright yellow. Mesothorax and scutellum granular from a very close punctuation. Tubercles with a prominent keel. Hind margin of scutellum rounded, with a wide median emargination. Tegulæ punctured. Wings subhyaline, strongly smoky in upper part of marginal cell, nervures black, second recurrent, going beyond tip of second submarginal cell. Posterior truncation of thorax shining black, with a pair of broad hammer-shaped yellow marks. Legs yellow; some black on anterior coxæ above, and at base of anterior femora, also at base of middle tibiæ and on basal two-thirds of hind tibiæ; inner sides of all the legs largely ferruginous. Middle and hind tibiæ, and basal joint of hind tarsi, all greatly broadened. Abdomen shining, microscopically tessellate, with large sparse punctures. Entire apical yellow bands on segments 1-5, broadest at the sides; apex yellow. Ventral scopa dense, white.

♂.—About the same size, abdomen more slender. Antennæ longer, scape yellow in front. Yellow spot near tip of eyes much reduced, line on vertex broken and nearly obsolete. Stripes on dorsulum wanting. Tegulæ with one large dark spot. Posterior truncation all black; upper part of pleura largely black. No spine on posterior coxa. First three bands of abdomen emarginate at sides. Rounded median hind border of sixth segment projecting. Apex rounded, broadly emarginate.

Hab.—Mesilla Valley, N.M., close to Agricultural College; a ♀ at flowers of *Larrea* (Creosote bush), May 6 [Ckll.]; also a ♀ taken May 18 by Mr. F. Garcia, and a ♂ taken some years ago by Prof. Townsend, both in the Mesilla Valley. Unfortunately the ♂ is reddened by cyanide. Mr. Fox kindly compared this species with Cresson's collection, and returned it marked "near *occidentale* and *zebratum*." It can be dis-

tinguished from these by the colour of the legs and the sides of the thorax.

(2.) *Anthidium occidentale*, Cress. — Described from specimens taken in New Mexico by Dr. Samuel Lewis in 1867. Not observed by me.

(3.) *Anthidium gilense*, n. sp. — ♀. Length hardly 10 mm.; robust, with long wings; black, with lemon-yellow markings. Head, mesothorax and scutellum with close, extremely large punctures, closest on front, largest on scutellum. Edge of mandibles with small, short, but quite distinct, teeth. Tubercles forming an oblong, sharp-edged lobe. Hind edge of scutellum straight, sharp, overshadowing metathorax. Second recurrent nervure going considerably beyond end of second submarginal cell. Abdomen of the subglobose type, shining, with large punctures, close enough to produce a subcancellate effect. Small spot on each side of clypeus; broad lateral face marks, extending only as far as level of antennæ, where abruptly truncate; continuous line on vertex, lateral thirds of front margin of mesothorax broadly, ends of tubercles, four spots on scutellum (the middle ones large and elongate), all yellow. Cheeks, pleura and shining posterior truncation, black. Tegulæ rufous, with an elongate yellow mark. Wings fuliginous, with a hyaline spot just beyond and partly in the third discoidal cell, and a much smaller one just beyond apex of second submarginal. Base subhyaline. Legs ferruginous, anterior femora blackened, a yellow stripe on anterior and middle tibiæ, a yellow spot at extreme base of hind tibiæ. First abdominal segment with an oblong yellow spot on each side. Second with a band, narrowly interrupted in middle, and produced into a short tooth on each side behind. Third to fifth segments with a pair of large quadrate yellow marks, and a small spot on each extreme side. Apical segment black. Ventral scopa white. Pubescence of legs, thorax and head white, but very little of it; a small but conspicuous patch behind the wings.

Hab.—West Fork of Gila River, N. M., July 17, one specimen [C. H. T. Townsend]. Of the N. M. species it most resembles *pudicum*, but it is quite distinct.

(4.) *Anthidium pudicum*, Cress. — Five at Santa Fé, N. M.: two on flowers of *Grindelia squarrosa*, Aug. 2 and 3, in company with *Heriades*, *Melissodes*, *Megachile* and *Podalirius*; two resting in hole in adobe wall, Aug. 2. A ♀ was submitted to Mr. Fox, and returned marked *pudicum*;

the N. M. form is perhaps a distinct race, as all have the markings yellow, whereas the typical form from Nevada has them white.

(5.) *Anthidium emarginatum*, Say.—Taken in 1867 by Dr. Lewis, and described by Cresson as *atrifrons*.

(6.) *Anthidium interruptum*, Say.—Las Cruces, N. M., and Chaves, N. M.: four, all taken by Prof. Townsend. Determined by Mr. Fox.

(7.) *Anthidium maculifrons*, Smith.—Taken in 1867 by Dr. Lewis. One taken by Prof. Townsend in Soledad Canon, Organ Mts., Aug. 15, 1896, on plant No. 40.

(8.) *Anthidium maculosum*, Cress.—Tuerto Mtn., near Santa Fé, 8,025 feet, Aug. 7, on flowers of *Senecio*. Besides the difference in the markings, this differs from the last in the abdominal punctation.

There is in New Mexico another bee which might easily be taken for a small *Anthidium*, namely *Stelis costalis*, Cresson. This is a very variable species, both as to size and colour. It was taken by Prof. Townsend on the West Fork of the Gila R., July 16, and by me at Santa Fé, on flowers of *Rudbeckia laciniata*, July 19. It is the only *Stelis* yet observed in New Mexico.

A NEW ATTID SPIDER.

BY T. D. A. COCKERELL, MESILLA, N. M.

Icius Peckhamæ, n. sp.

Length not quite 5 mm Cephalothorax above brilliant peacock green, slightly intermixed with brassy in front; white hairs above the row of eyes forming a weak band, also narrowly encircling the eyes; an irregular patch of white hairs beneath the hindmost eyes; lateral (inferior) margins of cephalothorax with a broad, well-defined white band. Legs black with white hairs, the hairs so arranged as to divide the legs into alternate sections of black and white; the tibiæ black at base and middle, the tarsi narrowly black at base. Palpi covered with white hairs. Mandibles black. Abdomen above brilliant metallic magenta, with the base yellowish green; the sides and the under surface white, minutely speckled with black.

Legs approximately 4 (31) 2. Quadrangle of eyes occupying less than half of cephalothorax. First row of eyes a little curved; middle eyes almost touching, lateral hardly half their diameter, and separated from them by a very short interval. Posterior eyes of the same size as anterior lateral, further from each other than from the lateral borders of the cephalothorax. Sternum with white hairs.

In alcohol the abdomen is not so brilliant, and most of those parts of the legs covered by white hairs appear brown. The legs have a little metallic colour.

First legs $2\frac{3}{4}$ mm. long, second $2\frac{1}{2}$, third 3, fourth 4. Width of abdomen, $1\frac{2}{3}$ mm. Length of cephalothorax, 2 mm.

Hab.—In the course of some investigations of the codling moth, this beautiful little spider was found not rarely hibernating under the bark of apple trees in Mesilla, N. M. Mr. G. W. Peckham, to whom specimens were sent, confirms it as new. *I. Peckhamæ* is respectfully dedicated to Mrs. Elizabeth G. Peckham, who, in conjunction with her husband, has done such admirable work on the Attid spiders. The present description will serve to fix the name; Mr. and Mrs. Peckham will no doubt figure the palpus, etc., when they come to revise the group.

SPHINX LUSCITOSA, CLEM.

On the morning of the 9th of June, 1897, Mr. Bice took from an electric-light pole in London a fine male specimen of that rare moth, *Sphinx luscitiosa*, Clem.

All the writers upon the Sphingidæ that I have consulted are agreed in pronouncing it rare. Mr. Grote says: "This is probably our rarest hawk moth of these kinds, proper to the Middle States." Dr. J. B. Smith states that "the species is very rare." This is the first report of its being taken in this section of the Province that I am aware of.

Prof. Fernald, upon information received from the Rev. G. D. Hulst, says that it had been bred near Newark, N. J., on willow. Dr. Smith says: "The species has been frequently raised in the vicinity of New York on willow." But whether willow is its natural food plant, or that the larvæ merely feed upon willow in preference to other plants offered to them, is not stated. If willow proves to be its natural food plant, it does seem decidedly strange that, with willow everywhere so plentiful, *luscitiosa* should yet remain so very rare, and would lead one to surmise that there must be some special influence at work that is the cause of it. Up to the time of Dr. Smith's writing (1888) no description of the larvæ was obtainable.

J. ALSTON MOFFAT.

London, Ont.

In my last communication *Agrotis catherina* is printed as a separate species, whereas it ought to have appeared as a synonym of *Semiophora tenebrifera*, Walk.

J. A. M.

Mailed September 2nd, 1897.

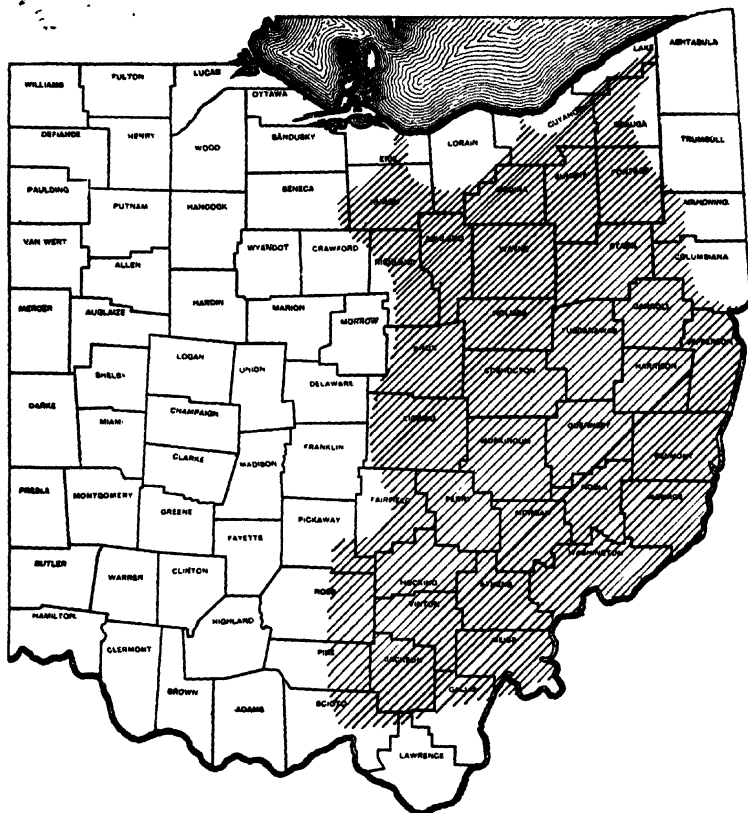


FIG. 1.—MAP SHOWING DISTRIBUTION OF BROOD IV, *CICADA SEPTENDECIM*, IN OHIO, IN 1897.



FIG 2



FIG 3.

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No. 10.

BROOD XV. OF CICADA SEPTENDECIM IN OHIO.*

BY F. M. WEBSTER, WOOSTER, OHIO

Having had the opportunity of working out the distribution of broods V., VIII. and XXII. in Indiana, brood XV. in Ohio possessed a peculiar interest for me, as in studying it I was able to profit considerably by my acquaintance with the others. I perhaps ought to say a word in regard to the three other broods mentioned, as one of them (XXII.) is treated of at considerable length in the Report of the Entomologist of the United States Department of Agriculture for the year 1885, and it was while connected with the Department as one of its special agents that these three broods were studied. Brood XXII. covered the entire State of Indiana, except a narrow strip of land around the lower end of Lake Michigan, from ten or fifteen to twenty miles wide, which area was exactly covered by brood V. in 1888. The coloured map which accompanies the report mentioned is defective in that the two points extending southward, not indicated as being covered by this brood, were, as was afterwards learned, within the area covered by brood XXII. and not covered by brood V., the line of separation being about ten miles east of the lake on the line between Michigan and Indiana, and running nearly south-west to the east line of Porter county, the course then trending slightly more to the westward to the Illinois line; in no case, I believe, extending to the Kankakee River, thus making the line of separation much more uniform than the one indicated on the map cited above, on which the dividing line is quite irregular.

Brood VIII. occurred in southern Indiana, becoming excessively abundant only in Harrison county, but covering the area south of a line drawn from Vincennes to Greencastle, Franklin, and eastward to northern Dearborn county. Singularly enough, a single female was brought me at Lafayette, fully 60 miles north of Greencastle, which probably marked the northernmost point where the species could be said to occur in any numbers.

* Read before Section "F," Zoology, of A. A. A. S., at Detroit, Michigan, August 10th, 1897.

One of the most striking peculiarities of brood XV. in Ohio was its exceedingly uneven distribution within the boundaries of its range. On driving over the country during the midst of the season of greatest activity, one would suddenly find himself in the midst of a din that was almost deafening, and the woods would be browned with discoloured twigs, while within a mile he would find himself in the midst of a silence that from contrast was almost oppressive, while there was not a discoloured twig to be observed. This lack of uniformity in distribution rendered the work of locating the exact boundaries of the brood quite difficult in some cases, as one must often go miles beyond it in order to be quite sure that he had found the last outlying colony. But in other cases the effect was the reverse. In going southward from Painesville, over the P. & W. Ry., which cuts through what is locally known as "Johnnycake Ridge," not a note was to be heard, and not a discoloured twig was to be seen on tree or shrub, but on leaving the cut, which is by no means a long one, the combined notes of the thousands of Cicadas were clearly heard above the noise of the train, while scarcely a tree or bush escaped the attack of the females, and some of them would not have been more thoroughly browned if a fire had broken out among them. In the city of Lancaster they were reported as abundant in the east part of the town, while there were scarcely any in the western portion, and it turns out that the dividing line between this brood and brood XXII. is practically indicated, as nearly the same conditions were observed to occur seventeen years ago.

The brood is certainly becoming weakened each time it reappears, and the boundaries of its occurrence did not in many cases extend as far as they did when it last appeared, sometimes the difference amounting to several miles. Near Painesville it occurred some three miles nearer to the lake shore in 1846 and in 1863 than it did in 1880 or the present year. It was at Bellevue in 1880, but did not extend so far west this year, and the same is true of its occurrence northward toward the lake. Where it was quite abundant in 1880 it did not appear at all this year. It was reported by two observing correspondents as having been present in limited numbers in Ashtabula county in 1863 and again in 1880, but no trace of it could be found this year. In short, it seems to be slowly but surely dying out, and will in time be known only in history. Brood XXII. is a much stronger one—at least it was in Indiana—but I question if in time the Periodical Cicada is not wholly exterminated in Ohio, and there seems no reason why this should not be true of many other States. The gradual

extinction of the native forests will have much to do with this, but their natural enemies, especially the English sparrow, are having a much more fatal effect.

In 1885, in Indiana, I first saw the English sparrow come in contact with the Periodical Cicada. In the city of Lafayette the insect appeared in considerable abundance, and for a few days there was no lack of the well-known notes of the male, but suddenly there was a decided falling off, and by listening carefully one would occasionally detect a note suddenly cut short at its very height, and close watching revealed the fact that the sparrows had come to recognize the note as well as the form of the musician, and as a result, within a few days, though there were myriads in the woods, not a single one could be found in the city, the abundance of wings upon the pavements showing too well the tragedies that had been enacted there.

With these observations in mind, I watched for the coming of brood XV. in Ohio with considerable interest. On the morning of May 28th a full complement of wings was found on the pavement under a shade tree, and during the following days these detached wings became more numerous, but not a Cicada note was heard. Going out into the residential portion of the town at dusk, I would observe pupæ emerging from the lawns and making their way to the shade trees across the pavement bordering the street, but not one could be found the next morning, though the pavement was littered with detached wings. While back in the woods a half mile away there were great numbers of them, creating almost a continual din during the day; in town during the whole season I only saw a single living adult and heard not a single note.

In southern Ohio I one day watched the Cicadas attempting to make their way across a clearing, from a bit of woods to an orchard situated some distance away and below the woods, which was on a bluff. The afternoon sun shone directly across the clearing, thus enabling me to witness every attempt of the insects to fly from woods to orchard. The sparrows were in the latter, and the moment a Cicada appeared its silvery wings would glisten in the sunlight for a few moments, when a sparrow or sometimes two of them would make a dash for it, and if the prey was missed, as was sometimes the case, the bird would turn suddenly and try again, generally with better success. I watched the actions of birds and insects for a couple of hours, but did not see a single Cicada cross the clearing. Though there were numbers of *Pieris rapæ* and some other

butterflies winging their way about over the clearing, I did not see a single mistake made on the part of the sparrows. They had become adept enough in two or three weeks to be able to distinguish a Cicada with an unerringness that was simply surprising, when we come to consider that none of their immediate progenitors could have seen or tasted a Cicada.

Other bird enemies appear to be very few, and these not over-voracious. Mr. J. J. Harrison, of Painesville, Ohio, saw the crow black-bird feeding upon them in 1846, while the labourers on the Station Farm at Wooster claim to have observed the robin to attack them. A species of *Tachina* fly seemed to play havoc with the latter portion of the brood, and either owing to this or some other reason, they suddenly disappeared between June 24th and June 28th. On the former date, in the Experiment Station orchard, they were excessively abundant, while on the latter there was not a living Cicada to be found there, while the stench arising from the dead bodies was quite apparent to one walking through the orchard.

As usual, the injury inflicted was slight, except in cases of very young orchards, and I saw in one case a, to me at least, unique form of attack. This is shown in the plate (fig. 3), and instead of the regular, quite conspicuous punctures (fig. 2) made by the female for a nidus, she appeared to have simply thrust her ovipositor into the wood, and with no further external wound deposited her ova.

The distribution of the brood in Ohio is illustrated in the accompanying map, plate 8, fig. 1.

In its distribution, rivers do not appear to have had much influence, as it will be noticed that in southern Meigs county a small area outlined by a bend in the Ohio River is only partly covered; in one township, Letart, the Cicada not being found at all; while a corresponding point of West Virginia comes within the range of distribution, even though lying across the river. From this point the dividing line trends slightly to the south-west, passing north of Gallipolis, and extending to the Scioto River, at a point a few miles above its mouth, but not extending beyond this to the westward. North the line follows the east bank of the river until the bend between Waverly and Chillicothe is reached, when it crosses the river and holds to its nearly northerly course to near Circleville. Here the line makes a sharp curve to the north-east to the city of Lancaster, in Fairfield county, but trends north-west to the eastern line of Franklin county, thence almost northward along the east line of

Delaware and Morrow counties to a point in Richland county about a mile west of the village of Ontario, when it changes again to the north-west, crossing the north-east corner of Crawford and the south-east corner of Seneca, then a little east of north to a point near Lake Erie, a mile and a half south-west of the city of Huron, Erie county. This area in Erie county is, however, but little more than a peninsula-like extension, and will probably not appear again. Near the south line of Erie county the line of demarcation makes a broad sweep to the south-east, thus leaving both the north-west and north-east corners of Huron county unoccupied, as well as all of Lorain county, except the southern portion and south-eastern border, and the western end of Cuyahoga county. Just west of Cleveland another peninsular extension occurs lakeward, where the Cicada appeared for a few days at first, but suddenly disappeared before the brood reached its maximum in numbers in the adjacent counties. This also will hardly appear again. From this point to near the eastern end of Lake county the insect keeps well back from the lake, though it formerly occupied ground much nearer to the shore. The eastern terminus also comprises but little more than a promontory, as the course here changes broadly to the south-west and then to the south east, leaving a considerable portion of eastern Geauga county and the north-east corner of Portage county unoccupied. The dividing line here only touches the south-west corner of Trumbull county and includes the western end of Mahoning and Columbiana counties and the southern border of the latter, the line passing into West Virginia or Pennsylvania, near East Liverpool, Ohio, where this year a very few Cicadas appeared, and where brood XV. overlaps brood XX.

I shall be obliged to confess that when I began to map out the area covered by brood XV. it was with more enthusiasm than I could command when I finished the survey. The map indicates, with a good degree of accuracy, the area over which the brood occurred in 1897, but that it will as accurately show the area covered by the brood in 1914, I have no expectations. The continued destruction of forests and the inroads made upon the brood by its natural enemies will result in great changes, not only in the outline of the area of habitation, but this will be composed of more and more isolated and continually decreasing "Cicada Islands," as I might term them, until the well-known notes of the male will have ceased forever, and the voiceless female will have followed her spouse into the shades of oblivion.

THE NINTH ANNUAL MEETING OF THE ASSOCIATION OF
ECONOMIC ENTOMOLOGISTS, DETROIT, MICH.,
AUGUST 12TH AND 13TH, 1897.

The Association met in Room 212, Central High School Building, immediately following the adjournment of Section F. Thirteen active members were present, together with many visitors, prominent among the latter being Dr. C. A. Dohrn, Prof. E. B. Poulton, Dr. C. P. Hart, Dr. C. S. Minot, and Dr. C. W. Stiles. The Association was called to order by the President, and in the absence of Secretary Marlatt a secretary *pro tem.* was chosen. The address of the retiring president, Prof. F. M. Webster, treated of "The Present and Future of Applied Economic Entomology in the United States," and contained, among other very interesting features, an admirable tribute to the value of the systematist and a somewhat caustic criticism of the "species maker," helpful suggestions for the experiment station worker, and a very frank discussion of the unfortunate results which attend the attempts sometimes made to combine politics and science. The following were elected to active membership :

G. B. King, Lawrence, Mass.
Gerald McCarthy, Raleigh, N. C.
E. P. Felt, Albany, N. Y
A. F. Burgess, Malden, Mass.
W. B. Barrows, Agricultural College, Mich.
R. H. Pettit, Agricultural College, Mich.
W. S. Blatchley, Indianapolis, Ind.

The following were elected foreign members :

Claude Fuller and Richard Helm, both of Perth, West Australia.

These additions increase the numbers of this Association to ninety-three active and thirty-one foreign members.

Following the election of members, Dr. L. O. Howard presented "Additional Notes on the Parasites of *Orgyia leucostigma*." This paper gave the results of the rearing of a large number of primary and secondary parasites, and contained a general discussion of the different phases of insect parasitisms.

"Temperature Effects as Affecting Received Ideas Concerning the Hibernation of Insects," by the same author, showed that a sudden alternation between low and high temperatures was remarkably fatal to the larvæ of clothes moths, Buffalo carpet beetles, and other insects of allied habits.

An abstract of "Notes on Certain Species of Coleoptera that Attack Useful Plants," by F. H. Chittenden, was read by the secretary *pro tem*. These notes treated chiefly of the food plants and habits of certain Chrysomelids.

A letter from Miss E. A. Ormerod called particular attention to the fact that the house sparrow had been very abundant and very obnoxious in certain parts of England, and it seemed probable that some legislation or public measures would need to be adopted to control this bird. The arrival from Tripoli of a cargo of wheat badly infested by the Angoumois moth was recorded and reference made to the occurrence in injurious numbers of *Xyleborus dispar* at Teddington.

Prof. P. H. Rolfs presented notes on "A Fungus Disease of the San José Scale." This disease seems to be confined to the southern part of the United States, but is very helpful to fruit growers there. The scale has been almost eradicated from several orchards by this disease. Laboratory and field experiments now in progress promise helpful results, but it does not seem probable that this disease will be of value in the northern part of the United States, since warmth and moisture are necessary for its development.

Mr. Barrows made a brief statement concerning the distribution of the San José scale in Michigan. The insect had been found scattered throughout the southern counties of the State, where it had probably existed for eight years. In discussing this paper, Mr. Craig spoke of the occurrence of the scale in southern Ontario, where there were at least seven infested localities.

A paper from Prof. C. P. Gillette, on "Insects Taken at Light and Sugar," evoked considerable discussion, and was followed by "A Study of the Possible Origin and Distribution of the Chinch Bug," by Prof. F. M. Webster. The author advanced the idea that this insect had originated in the southern part of the United States, and spread by two diverging streams up the Mississippi Valley and along the eastern Atlantic coast. In the former region the long-winged form predominated, while the coast form was short-winged. In the discussion following this paper the general opinion seemed to be that the length of the wings depended upon environment rather than heredity. Mr. C. W. Mally recorded the capture at Ohio of a specimen having one long and one short wing, thus throwing additional light upon the relationship between the two forms.

"Notes on the Common House Fly," by Mr. Howard, gave the

negative results of a series of experiments with lime, land plaster, etc., used to destroy the larvæ of the house fly. He emphasized the necessity of greater cleanliness in the management of horse stables.

A paper from Mr. Gillette, on "Vernacular Names of Insects," was read and referred to a committee consisting of Messrs. Howard, Fernald and Lintner. A communication from C. P. Lounsbury, giving very interesting notes on "Cape of Good Hope Insects," particularly the locusts of that region, was then read.

Mr. H. G. Hubbard presented an account of the "Insect Fauna of the Giant Cactus," recording the capture of a large number of insects on this plant and giving notes on their habits.

Mr. Howard described "A Valuable Coccid" lately discovered in Arizona and New Mexico, from which, by suitable treatment, a good grade of white wax could be obtained. The refuse from this operation is of the nature and consistence of India-rubber, and may be of commercial value.

"Notes on Insects of the Year," by Messrs. Webster and Mally, recording interesting experiences with several of the common insect pests. The negative results of a series of experiments with kainit, against the insects attacking the roots of the grape, caused considerable discussion, and the need for further experimentation along this line was pointed out.

A paper by A. H. Kirkland, on "Preparation and Use of Arsenate of Lead," detailed a method of preparing this insecticide at a cost of about seven cents per pound. Work against the Gypsy moth was mentioned, and the condition of the infested region was reported as generally better than that of last year. This undertaking, however, is still handicapped by insufficient financial support.

"A Malodorous Carabid," by Mr. Barrows, gave extensive notes on the annoyance and discomfort caused by the almost unbearable odour of this insect, *Nomius pygmaeus*.

At the final adjournment of the session it was voted to hold the next meeting at Boston, Mass., August 19th and 20th.

Several resolutions were passed, among which were (1) a resolution requesting the publication of the proceedings as a bulletin of the Division of Entomology, U. S. Dept. of Agriculture, and (2) expressing familiarity with the efforts of the State of Massachusetts to exterminate the Gypsy moth, and commending the results already accomplished.

The election of officers resulted as follows: President, Herbert Osborn, Ames, Iowa; 1st Vice-President, Lawrence Bruner, Lincoln, Neb.; 2nd Vice-President, C. P. Gillette, Ft. Collins, Colo.; Secretary and Treasurer, C. L. Marlatt, Washington, D. C.

A. H. KIRKLAND, Secretary *pro tem*.

A LIST OF THE COLEOPTERA OF THE SOUTHERN
CALIFORNIA ISLANDS, WITH NOTES AND
DESCRIPTIONS OF NEW SPECIES.

BY H. C. FALL, PASADENA, CAL.

Early in May of the present year (1897) the Pasadena Science Club sent three of its members on a month's general collecting trip to certain of the Santa Barbara islands lying off the coast of Southern California. While none of the members of the expedition were, strictly speaking, entomologists, a considerable experience in collecting, combined with some preliminary instruction, enabled them to devote intelligently a portion of their time to the collection of insects, more especially of the Coleoptera.

The islands visited were in the order named, Santa Barbara, San Nicolas, and San Clemente, distant respectively forty, sixty, and fifty miles from the nearest point on the mainland. Inasmuch as the entire material in Coleoptera, consisting of forty-six species and upward of one thousand specimens, has been submitted to me for study, it seems a fitting occasion for presenting as complete a list as possible of the coleopterological fauna of the entire group of islands, from Santa Cruz to Guadalupe.

To Eastern collectors it may seem a matter for wonderment that so interesting a field should so long remain, entomologically speaking, practically unexplored; yet it must be remembered that entomologists are here exceedingly few and far between, and the islands are, with the exception, for the past few years, of Catalina, nearly or quite uninhabited and not conveniently accessible. Every now and then, to be sure, an Eastern man appears with bottles and net, but to him the whole vast region is a terra incognita. Mountain and desert and valley offer opportunities without number; he takes the goods the gods provide and troubles not himself about possibilities in lands hull down in the Pacific. And so it happens that the few beetles recorded from the islands we owe to the kindness of one or another of the botanists or ornithologists who have at long intervals found their way there.

It is believed by those best competent to judge that these islands are the summits of a submerged mountain range forming a part of the mainland, or at least connected with it as a peninsula, until after the beginning of the Quaternary Period, when it was separated and broken

up into islands by subsidence. The close similarity between the flora and fauna of Guadalupe and California has several times been cited in support of this view and seems in itself almost conclusive.

As far as I can learn from the literature at hand, the following fifteen species of Coleoptera are all that were described or reported from the islands up to 1875 :

From Santa Cruz—*Asaphes tumescens*, *Malthodes laticollis*, *Phobetus comatus*, *Ernobius debilis*, *Helops Bachei* ; from Santa Catalina—*Pristoscelis punctipennis* and *P. pedalis* ; from San Clemente—*Coniontis lata*, *Eusattus robustus*, *Eulabis grossa*, *Amara insularis* ; from Santa Barbara—*Eleodes scabripennis*, *Cibdelis Bachei* and *Meloe barbara*. *Pristoscelis ænescens* is said to be "from the islands off Santa Barbara," and it is more than probable that the same reading should be applied to the three preceding species. Nearly if not all the above named species were taken either by C. M. Bache or Dr. J. G. Cooper and given to Dr. Leconte, by whom they were described (1861–1866), with the exception of *Amara insularis*, which was described by Dr. Horn in 1875.

In 1875, Dr. Edward Palmer brought from the Guadalupe Islands the following twenty-three species, which were enumerated by Dr. Horn, Trans. Am. Ent. Soc., V., 1876 :

<i>Calosoma semilæve</i> , Lec.	<i>Trogosita virescens</i> , Fab.
" Palmeri, Horn.	<i>Saprinus lugens</i> , Er.
<i>Bembidium striola</i> , Lec.	<i>Cardiophorus luridipes</i> , Cand.
<i>Amara insignis</i> , Dej.	<i>Pristoscelis pedalis</i> , Lec.
" californica, Dej.	<i>Necrobia rufipes</i> , Fab.
<i>Platynus maculicollis</i> , Dej.	<i>Coenonycha socialis</i> , Horn.
<i>Calathus obscurus</i> , Lec.	<i>Atimia dorsalis</i> , Lec.
<i>Tachycellus nebulosus</i> , Lec.	<i>Cœlotaxis muricata</i> , Horn.
<i>Anisodactylus piceus</i> , Mén.	" punctata, Horn.
<i>Anisotarsus flebilis</i> , Lec.	<i>Conibius seriatus</i> , Lec.
<i>Necrophorus nigrita</i> , Mann.	<i>Helops Bachei</i> , Lec., var.
<i>Dermestes vulpinus</i> , Fab.	

In an appendix to the annual report of the Chief of Engineers for 1876, Dr. Leconte gives a list of species taken in So. California the previous year by the expedition for geographical survey under Lieut. Geo. M. Wheeler, among which are the following seventeen species from the island of Santa Cruz :

Omophron dentatum, Lec.	Tropisternus californicus, Lec.
Bembidium transversale, Dej.	Hydrocharis glaucus, Lec.
Calathus ruficollis, Dej., var.	Carpophilus pallipennis, Say.
Platynus brunneomarginatus, Mann.	Polycaon Stoutii, Lec.
Pterostichus lætulus, Dej.	Phlæodes diabolicus, Lec.
Amara californica, Dej.	Coniontis viatica, Esch.
Anisodactylus consobrinus, Lec.	" subpubescens, Lec.
Hippodamia vittigera, Mann.	Cratidus osculans, Lec.
Dermestes talpinus, Mann.	

In 1892 — Zoe, Vol. III., p. 262 — Mr. F. A. Seavey gives a short list of insects taken by him on Santa Catalina in August of that year. This list includes fourteen species of Coleoptera, of which three — *Balaninus obtusus*, *Pristoscelis quadricollis* and *Anthonomus canus* — are quite surely incorrectly determined and will not be included in the following list.

During parts of July and August, 1892 and 1894, about four weeks in the aggregate was spent by the writer on Catalina. The island was then very dry and collecting was rather unremunerative. Nevertheless upward of one hundred species were added to previous records.

To these must be added more than thirty species out of seventy-five taken by Dr. Gustav Eisen on Santa Rosa during May of the present year; a few taken on Catalina by Dr. A. Fenyès, of Pasadena, at about the same time; and finally, about half of the forty-six species collected by the expedition alluded to at the beginning of this article. The material collected by them is of especial interest inasmuch as it is probable that no insects have before been brought from either Santa Barbara or San Nicolas—the most remote of all the islands of the Santa Barbara group—and but four beetles from San Clemente. The catch of Dr. Eisen on Santa Rosa is of nearly equal interest for similar reasons. The following abbreviations are used in the subjoined list:

B. Santa Barbara.	G. Guadalupe.
Ca. Santa Catalina.	N. San Nicolas.
Cl. San Clemente.	R. Santa Rosa.
Cz. Santa Cruz.	

* Species hitherto recorded from same island.

† Species not known to occur on mainland.

- Cicindela oregona*, Lec. R.
Omophron dentatum, Lec. Cz.* R.
Cychrus mimus, Horn. Ca.
Calosoma semilæve, Lec. G.* R.
† " *Palmeri*, Horn. G.*
Dyschirius gibbipennis, Lec. R.
Schizogenius depressus, Lec. Ca.
Bembidium transversale, Dej. Cz.
* R.
Bembidium striola, Lec. Ca. G.*
" *platynoides*, Haywd. R.
" *indistinctum*, Dej. R.
" *ephippiger*, Lec. R.
" *iridescens*, Lec. Ca.
Tachys vittiger, Lec. Ca.
" sp. nov.? Cl.
Pterostichus Isabellæ, Lec. Ca. Cl.
" *Menetriesii*, Mots. R.
" *lætulus*, Lec. Cz.* R.
" sp. indet. R.
Amara insignis, Dej. G.* Ca.* R.
† " *insularis*, Horn. Cl.* N. B.
" *californica*, Dej. G.* Cz.* R.
Calathus ruficollis, Dej. Ca. Cz.*
" *obscurus*, Lec. G.* R.?
Platynus brunneomarginatus, Mann.
Ca.* Cz.* R.
Platynus funebris, Lec. Ca.
" *maculicollis*, Dej. G.* R.
" *variolatus*, Lec. Ca.
Brachynus carinulatus, Mots.? Ca.
Chlænien obsoletus, Lec. Ca.
Agonoderus lineola, Fab. R.
Stenolophus limbalis, Lec. Ca.
Bradycellus rupestris, Say. Ca.
" *californicus*, Lec. R.
Tachycellus nebulosus, Lec. G.*
" *nitidus*, Dej. Ca. R.
Anisodactylus dilatatus, Dej. R.
" *piceus*, Mén. G.* R.
Anisodactylus consobrinus, Lec.
Ca. Cz.* R.
Anisodactylus californicus, Dej.
Ca. R.
Anisotarsus flebilis, Lec. G.*
Deronectes striatellus, Lec. R.
Hydroporus vilis, Lec. Ca. R.
Agabinus glabrellus, Mots. Ca.
Agabus lugens, Lec. R.
Ochthebius discretus, Lec. Ca.
Tropisternus ellipticus, Lec. Ca.
Tropisternus californicus, Lec. Ca.
* Cz.*
Hydrocharis glaucus, Lec. Cz.* R.
Chaetarthria nigrella, Lec. Ca.
Laccophilus ellipticus, Lec. Ca. R.
Cymbiodyta dorsalis, Mots. Ca. R.
Cercyon luniger, Mann. Ca.
Necrophorus guttula, Mots. Cl.
Necrophorus nigritus, Mann. G.*
Cl. R.
Silpha ramosa, Say. R.
" *lapponica*, Hbst. R.
Aleochara bimaculata, Grav. Ca. Cl.
" *sulcicollis*, Mann. R.
Polistoma arenaria, Csy. Ca. B.
Heterothops californicus, Lec. Ca.
Creophilus villosus, Grav. Ca. Cl.
Hadrotus crassus, Mann. R.
Philonthus longicornis, Steph. Ca.
" *nigritulus*, Grav. Ca.
" *Lecontei*, Horn. R.
Actobius puncticeps, Horn. Ca.
Cafius canescens, Mann. N.
" *lithocharinus*, Lec. R.
" *luteipennis*, Horn. R.

- Cafus sulcicollis*, Lec. R.
 " *opacus*, Lec. Ca.
Lathrobium jacobinum, Lec. R.
Caloderma reductum, Csy. Ca.
 " *mobile*, Csy. Ca.
 " sp. Ca.
Tachyporus californicus, Horn. Ca. R.
Pseudopsis, sp. Ca.
Haploderus flavipennis, Csy. Ca.
Apocellus analis, Lec. Ca.
Hippodamia vittigera, Mann. Cz.*
Hippodamia ambigua, Lec. Ca.* Cl. R.
Hippodamia convergens, Guér. Ca.*
Coccinella, v. *californica*, Mann. Ca. Cl. N. R.
Cycloneda oculata, Fab. Ca.
 " *sanguinea*, Linn. Ca.*
Psyllobora, v. *tædata*, Lec. Ca.*
Chilocorus bivulnerus, Muls. Ca.*
Cryptognatha catalinæ, Horn. Ca. Cl.
Hyperaspis lateralis, Muls. Ca.*
Scymnus guttulatus, Lec. Ca.
 " *nebulosus*, Lec. Ca.
 " *cervicalis*, Muls. Ca.
 " *marginicollis*, Mann. Ca.
 " *ardelio*, Horn. Ca. Cl.
Cephaloscymnus occidentalis, Horn. Ca.
Cephaloscymnus ornatus, Horn. Ca.
Rhizobius lophanthæ, Blaisd. Cl.
Åphorista morosa, Lec. R.
Cryptophagus, sp. Ca. Cl.
Atomaria, sp. R.
Dermestes marmoratus, Say. Ca. Cl. N. R.
Dermestes Mannerheimii, Lec. Cl. N. B. R.
Dermestes talpinus, Mann. Cz.*
 " *tristis*, n., sp. R.
 " *vulpinus*, Fab. G.*
Trogoderma sternale, Jayne. Ca.
Hololepta vicina, Lec. Ca.
Saprinus interstitialis, Lec. Ca.
 " *lugens*, Er. Cl. N. B. G.* R.
 " *fimbriatus*, Lec. Ca.
 " *vitiosus*, Lec. Ca.*
 " *lubricus*, Lec. Ca. Cl. R.
 " sp. near *laridus*. Ca.
Cercus sericans, Lec. Ca.
Carpophilus pallipennis, Say. Ca.* Cz.* Cl.
Coninomus fulvipennis, Mann. Ca.
Corticaria distinguenda, Com. Ca. Cl.
Corticaria, sp. Ca.
Trogosita virescens, Fab. G.*
Dryops productus, Lec. Ca.
Cardiophorus luridipes, Cand. G.*
Melanotus variolatus, Lec. Ca.
Asaphes tumescens, Lec. Cz.*
Acmæodera connexa, Lec. R.
Telephorus notatus, Mann., var. Ca.
Malthodes laticollis, Lec. Cz.*
Collops cribrosus, Lec. R.
Endeodes abdominalis, Lec. Ca.
 † " sp. Ca.
 " sp. R.
Malachius, sp. nov.? R.
 † *Attalus subfasciatus*, n. sp. Cl.
Pristoscelis ænescens, Lec. B.* R.
 " *punctipennis*, Lec. Ca.*
Pristoscelis pedalis, Lec. Ca.* G.* Cl.

- Listrus*, sp. Cl. R.
 † *Dasytes*, sp. nov. Ca.
 † " sp. nov. Cl.
Eschatocrepis constrictus, Lec. Ca.
Cymatodera ovipennis, Lec. Ca.
 " *angustata*, Spin. R.
Necrobia rufipes, Fab. G. * Ca.
 Cl. R.
Necrobia ruficollis, Fab. Cl.
 † *Ernobius debilis*, Lec. Cz. *
 † *Oligomerus*? n. sp. Ca.
Trypopytes tenuilineata, Horn. Ca.
Hemiptychus obsoletus, Lec.? Ca.
Euceratocerus Hornii, Lec. Ca.
Sinoxylon declive, Lec. N.
Polyscaon Stoutii, Lec. Cz. *
Cis, sp. Ca.
Cœnonycha rotundata, Lec. Ca.
 † " *socialis*, Horn. G. *
Phobetus comatus, Lec. Ca. Cz. * R.
Cyclocephala villosa, Burm. Ca.
Phymatodes juglandis, Leng? R.
Oeme gracilis, Lec. Ca.
Romaleum simplicicollis, Hald. Ca.
Megobrium Edwardsii, Lec. R. *
Xylotrechus oblitteratus, Lec. Ca.
Atimia dorsalis, Lec. G. *
Ipocheus fasciatus, Lec. Ca.
Pachybrachys, sp. Ca.
 " sp. Ca.
Diachus auratus, Fab. Ca. Cl. R.
 † *Colaspidea subvittata*, n. sp. Ca. Cl.
Diabrotica soror, Lec. Ca. *
Monoxia puncticollis, Say. R.
Phyllotreta pusilla, Horn. Ca.
Bruchus pauperculus, Lec. Ca.
Eurymetopon convexicollis, Lec. Ca.
Phloeodes diabolicus, Lec. Cz. *
Nyctoporis carinata, Lec. Ca. R.
Coniontis elliptica, Csy. Ca. R.
 † " *lata*, Lec. Cl. * B. R.
 † *Coniontis lata*, var. *insularis*, Csy.
 Cz. * R.
Coniontis viatica, Lec. Cz. *
Coniontis subpubescens, Lec. Ca.
 Cz. *
 † *Cœlotaxis punctulata*, Horn. G. *
 † " *muricata*, Horn. G. *
 † " *angustula*, Csy. G. *
 † *Cœlus pacificus*, n. sp. N. R.
 † " *remotus*, n. sp. Cl.
 † *Eusattus robustus*, Lec. Cl. *
 " *politus*, Horn. R.
Eleodes quadricollis, Esch. Ca.
 " *dentipes*, Esch. Cl. N. R.
 " *scabripennis*, Lec. B. * R.
 † *Eulabis grossa*, Lec. Cl. * N. B.
 " *pubescens*, Lec. Ca.
 " *obscura*, Lec. R.
Amphidora littoralis, Esch. Ca. R.
Cratidus osculans, Lec. Cz. * R.
Cibdelis Bachei, Lec. B. *
Blapstinus rufipes, Csy. Ca.
 " *brevicollis*, Lec.? R.
Conibius seriatus, Lec. G. *
Notibius sulcatus, Lec. Cl.
 † *Helops Bachei*, Lec. R.
 † " " var. G. *
 " sp. Ca.
Hymenorus infuscatus, Csy. Ca.
Isomira variabilis, Horn. Cl.
Pentaria nubila, Lec. Ca.
Anaspis collaris, Lec. Ca.
Mordellistena, sp. Ca.
 " sp. Ca.
Notoxus constrictus, Csy. Ca.

Anthicus californicus, Laf. Ca. Cl.	Apion antennatum, Sm. Ca.
" sp. Ca. Cl.	" ædorhynchum, Lec. Ca.
† Meloe barbara, Lec. B. *	Cleonus basalis, n. sp. Cl.
" sp. Ca.	Smicronyx, sp. R.
Rhynchites aureus, Lec. Cl.	Anthonomus pauperculus, Lec. Ca.
" sp. nov.? Ca.	Tychius, n. sp. N.
Trigonoscuta pilosa, Mots. Cl. R.	Balaninus occidentis, Csy. Ca.
Sciopithes setosus, Csy. var. Cl.	Sphenophorus vomerinus, Lec. R.

Concerning the value of certain names upon which there is a disagreement among authorities I am unable to offer any very well founded opinion. I am, however, inclined to doubt the validity of *Cryptognatha catalinae*, Horn, and *Cælotaxis angustula*, Casey; and on the other hand it seems probable that *Conibius guadalupensis*, Casey, is a good species and not a form of *seriatus* as recorded by Dr. Horn.

Tachys, sp. —Two specimens from Clemente are closely allied to *corax*, Lec., but seem distinct by the obviously less transverse thorax.

Amara insularis, Horn. —Very abundant on all the islands visited by the Pasadena party. I saw no signs of it on Catalina in midsummer, though the dried remains of *insignis* were common enough.

Agabinus glabrellus, Mots. —Not rare on Catalina. Very scarce on the mainland in the streams in the mountain canons.

Cercyon luniger, Mann. —A small number found in decaying seaweed on Catalina; *fimbriatum*, which may be found by thousands along the opposite coast, has not yet been detected.

Hippodamia ambigua, Lec. —Specimens from Santa Rosa might with equal propriety be placed with *convergens*. Unless some other character than thoracic markings can be discovered to separate these two so-called species they cannot be held as distinct. They constantly occur together everywhere in South California, and intermediate forms are frequent.

Rhizobius lophanthæ. —It is certain that this beetle is an importation from Australia, but it seems very probable that the pioneers were not introduced as advertised. How it first got here is a mystery, but it is surely here to stay, and is now quite as much at home as any of our native Scymni. Although already widely distributed in California, its occurrence on an island so distant and so rarely visited as San Clemente was, to say the least, unexpected.

Aphorista morosa. —According to Mr. Ricksecker this and *leta* are

sexes of the same species, the latter being the female. *Morosa* is in my experience much more commonly met with in So. California than *lata*.

Endeodes.—The species of this genus are among the most curious of the Coleoptera inhabiting the California sea beaches. They are to be found most frequently in April and May running about on the sand, or concealed under rubbish or driftwood so common in such situations. The two undetermined species are represented by one specimen each. That from Catalina was taken by me in July, and is quite surely nondescript, differing from our described species by the very minute elytra, as well as in coloration. The Santa Rosa example is almost entirely black, and is possibly a colour variety of *collaris*.

Phobetus comatus.—There is a very confusing amount of variation exhibited by specimens of this species from various localities in the State. Specimens taken by myself on Catalina, of small size, subimpunctate thorax with hind angles entirely wanting, seem quite distinct when compared with a series from Fresno county, of larger size, different colour, rather closely punctate thorax with distinct hind angles. I have, however, seen intermediate forms, and it would be unsafe to make a division without a large series from diverse localities. The name *testaceus* was originally given by Leconte to specimens from Santa Cruz Island, and it may possibly have to be revived.

Xylotrechus oblitteratus.—A fine series of this beautiful longicorn was taken by Dr. Fenyès on Catalina. All the specimens found were males, the females being indeed very rarely taken. The species occurs on willows.

Ipochus fasciatus.—This occurs rather plentifully on Catalina under the bark and on the branches of dead *Rhus laurina* (or *R. integrifolia*). The form, size, sculpture and markings vary greatly, often in a series taken from the same tree.

Balaninus occidentis, Casey.—This species has heretofore been confounded with *uniformis*, but is abundantly distinct. It is common enough on Catalina, but much less so on the mainland, frequenting several species of oaks.

A certain small species taken on Santa Catalina by myself in 1894, and again found on Clemente this year, has not been included in the list for the simple reason that its affinities are not yet sufficiently clear to admit of placing it even in a family sense. Two of our specialists to whom specimens have been sent have ventured opinions that are quite at variance; the case is therefore postponed for further hearing.

It is not unlikely that a few species have been overlooked in the preparation of the preceding list, but it is hoped that any such omission may not seriously impair its usefulness as a foundation on which to base any future reports on the Coleoptera of these islands.

It need scarcely be said that the 226 species enumerated here can represent but a fraction of the entire coleopterological fauna.

The following species, it is believed, are now made known for the first time. There are surely a number of other undescribed species, but their description would involve far more study than can now be devoted to them.

Cælus pacificus, n sp.—Broadly oblong, elliptical, moderately convex, piceous black, surface polished. Epistoma broadly sinuate, antennæ with three-jointed club. Prothorax equal in width to the elytra, a little more than twice as wide as the length at the middle, widest immediately before the base, sides rather feebly arcuate and strongly convergent, moderately densely evenly punctate throughout. Elytra twice as long as the thorax along the median line, not longer than wide, equally densely but more finely punctate than the thorax, the punctures not in the least asperate on the disk, and only very feebly so on the declivity and along the margin. Process of first tarsal joint extending under the next three.

Length, 7 mm.; width, 5 mm.

Very distinct from any of our described species by the conspicuously long prothorax, and from all but the next in the almost entire lack of elytral asperities. The marginal fringe of hairs on the prothorax is noticeably shorter and finer than in any of our mainland species. Described from a single example of unknown sex taken on San Nicolas, May 24. Since the above description was written I have seen numerous examples in the material collected by Dr. Eisen on Santa Rosa. With the exception of some variation in size these differ in no noteworthy respect from the San Nicolas type.

Cælus remotus, n sp.—Very convex, piceous black, legs and elytra brown. Epistoma broadly sinuate, antennal club four-jointed. Prothorax similar in outline to *pacificus*, but shorter; surface subopaque, densely coarsely punctate. Elytra shining, densely finely punctate, without trace of asperities. Process of first tarsal joint extending beneath the next two.

Length, 6.5–7 mm.; width, 4–4.5 mm.

The above brief description is sufficient to characterize this some-

what remarkable species, of which a single pair was taken (June 3) on San Clemente.

The marginal fringe is longer than in *pacificus*, but thinner than usual.

Both the above described species were found under rubbish at a distance from the shore, and have probably the habits of *Coniontis* and *Cœlotaxis* rather than those of the other members of the genus. This might indeed be safely inferred from the less developed marginal hairs and lack of elytral asperities, which have an undoubted connection with the habits possessed by the mainland species of burrowing in loose sand. Whether we have here a change from the ancestral mode of life, due to a change of environment, or whether, as seems to me more likely, the burrowing habit is of recent development and the island species are the surviving representatives of an earlier type, is an interesting question.

Cleonus basalis, n. sp. — Moderately stout, integuments black, polished. Beak three-fourths as long as the prothorax, not dilated at tip, rather thinly clothed above and beneath with short cinereous hairs, sides glabrous, above subcarinate in basal two-thirds, rather coarsely punctate throughout. Prothorax as long as wide, sides very slightly convergent, apex feebly constricted, basal lobe angulate, surface very closely densely punctate, feebly carinate in apical half, deeply excavate behind. Vestiture condensed in four narrow vittæ; the two dorsal approximate in front, posteriorly divergent and incomplete; the lateral vittæ dislocated at the apical constriction. Elytra barely twice as long as wide, humeri rounded, tips separately rounded and scarcely acuminate; striæ composed of large, closely-placed punctures; intervals scarcely wider than the punctures, especially on the disk; base strongly impressed each side, leaving the base of the third and to a less degree that of the sixth interval strongly tumid. The third, fourth, fifth and outer three intervals are so thinly clothed as to appear glabrous; the first is, however, very finely pubescent throughout, as is the seventh behind the middle. The dark areas contain a few small spots of condensed hairs, and there is a larger conspicuous spot at the base of the second interval. Lower surface and legs as usual. The third joint of hind tarsi is small, but obviously wider than the second.

Length, 10 mm.; width, 3.5 mm.

Hab.—San Clemente.

The single male above described must evidently be placed near

quadrilineatus by Casey's table — Coleop. Not., III., p. 186 — but the deep basal excavations of the thorax and elytra, as well as the dense punctuation of the former, clearly separate them. The ocular lobes are moderately well developed in *basalis*, and are said to be wanting in *quadrilineatus*.

Attalus subfasciatus, n. sp.—Very small, narrow, depressed, black, thorax with sides behind and base narrowly testaceous, elytra with a slightly antemedian pale fascia which is interrupted at the suture. Head broad, antennæ slender, not in the least serrate, reaching the middle of the elytra (♀), or as long as the entire body (♂), the four basal joints pale. Thorax narrowed behind, of the same form as in *Endeodes*. Elytra parallel (♂), or posteriorly dilated (♀). The pubescence consists as usual of very short semi-erect hairs, with longer erect darker hairs sparsely placed.

Length, 1.5–2 mm.

Hab. — San Clemente.

Described from one ♂ and eight ♀s. A very peculiar little species, differing in antennal structure, form of thorax and style of elytral coloration from all other species in our fauna. It may for the present be placed next to *lobulatus* in which there is a faint indication of the present form of thorax.

Colaspidea subvittata, n. sp.—Piceous, with more or less distinct greenish-bronze lustre; legs, more especially tibiæ and tarsi, rufescent. Sides of prothorax not strongly rounded, punctuation moderately close, a little coarser on the elytra. Pubescence long (for the genus), recumbent, distinctly subvittate on the elytra in fresh examples. Length, 3.5–4.5 mm. Found abundantly by me on Catalina, also brought from Clemente. There is practically no variation except in size in the large number of specimens examined. The mainland species, on the contrary, exhibit a bewildering amount of variation in size, colour, punctuation, and even in form. One variety of varicolor is of nearly the same colour, but the pubescence is erect and the thorax more strongly rounded at the sides. The pubescence is much more easily removable in *subvittata* than in any of the other species, and the vittate arrangement is scarcely evident except in very fresh examples. In the males the antennæ are somewhat longer and all the tarsi moderately dilated—characters common to all the species of the genus.

Dermestes tristis, n. sp.—Length, .22–.26 inch. Elongate convex, parallel, black, clothed above with black pubescence, with a sprinkling of paler hairs on the prothorax, and rarely mottled with cinereous hairs on the elytra. Scutellum densely clothed with ochreous hairs, usually forming the only relief to the sombre aspect of the upper surface. Thorax not very obtusely rounded in front, anterior portion of lateral margin invisible from above, sides uniformly rounded, slightly sinuate before the front angles, which are distinct and only slightly obtuse. Surface of thorax densely, more coarsely punctate than usual. Beneath clothed as usual with dense white pubescence, with lateral series of black spots; prevailing colour of last ventral whitish; legs annulated with white. Males with median pits on third and fourth ventrals, tarsi clothed beneath with spinous hairs. Occurs in various parts of maritime So. California, and on Santa Rosa Island.

One of our smallest species, perhaps most nearly resembling *talpinus*. The latter is, however, more robust, with ochreous and gray mottlings on the elytra, sides of thorax more strongly rounded near the base, and pubescent male tarsi.

It seems not to have been noticed that in a considerable number of our species of *Dermestes* the front and middle tarsi of the male are rather densely pubescent beneath. The character is an important one and enables us to establish the distinctness of *Mannerheimii*, which has never looked right as a variety of *marmoratus*. These last named species may then be thus compared:

MARMORATUS.—Size large (.40–.45 in.), elytra mottled with ochreous and cinereous hairs, tarsi spinous beneath in both sexes.

MANNERHEIMII.—Size smaller (.24–.32 in.), elytra mottled with cinereous only, front and middle tarsi (♂) pubescent beneath.

HEPIALUS QUADRIGUTTATUS, Grote.—This large salmon-pink variety was taken this year near Metis, P.Q. Messrs. L. Reford and E. Brainerd, of Montreal, chanced one day to pick up the wing of a specimen on a little dry area in a swamp several miles from Metis. They returned to the village for a lantern, and then tramped back again. Their industry was rewarded by the capture of two specimens. They saw five others, and report that the moths appeared about nine o'clock p.m., and flew in a zigzag horizontally, not up and down like *H. thule*. This species has been taken in Ontario by Mr. Elcome, at Peterborough, and at Roach's Point, Lake Simcoe.

LEDRA PERDITA vs. CENTRUCHUS LIEBECKII.

BY F. W. GODING, M. D., PH. D., RUTLAND, ILL.

In the February CANADIAN ENTOMOLOGIST, page 38, Prof. C. F. Baker contributes an article on *Ledra perdita*, A. and S., in which he attempts to identify the insect described by Amyot and Serville under that name with my *Centruchus liebeckii*. Those authors describe their species from an admittedly inaccurate figure, the original type having been destroyed. They state that their species is from Northern America. [See note.] Van Duzee states (fide Baker) that *perdita* is from Pennsylvania, on what authority I do not know, and Prof. Baker decides that because Van Duzee gives that State as the habitat of the insect, and my species having been described from the same commonwealth, they must be identical. As there is no proof beyond the dictum of Van Duzee that *Ledra perdita* is from Pennsylvania that point may be dropped until we hear further from him. He is too careful a student of our Homoptera to be guilty of confusing a Membracid with a *Ledra*. The facts regarding Fitch's identification are these: While in Washington a few years ago, and working over the Fitch material, I found an example of *Liebeckii* labeled in Fitch's handwriting, "*Ledra perdita*, A. and S.," and "*capra*, Mels.," both names being on the label, which I recorded in the CANADIAN ENTOMOLOGIST, Vol. XXV., p. 172. Fitch never published his opinion regarding this species. Prof. Baker (l. c.) says: "So peculiar in form is it that there is not a possibility of confusing it with anything else in our fauna." Since that was written he has come into possession of a copy of Fowler's great work on the Membracidae of Mexico and Central America, and I do not doubt that since he has examined Fowler's figure of *Centruchoides laticornis* his opinion has undergone a change, for the figure of *perdita* certainly resembles that figure as closely as it would a figure of *Liebeckii*. The same is true with several others of the Centrotinae, viz., *callicentrus*, etc., etc., from "Northern America."

NOTE.—I do not know where Mr. Van Duzee publishes my reference to this species beyond a note in his catalogue of the Jassidae, wherein he says: "One American species of *Ledra* has been described, but I have not yet seen an example." Doubtless he here refers to Amyot and Serville's species.

Now, regarding *Microcentrus caryæ*, Fitch, and *Centruchus Liebeckii* being congeneric, at the time I wrote the description of *Liebeckii* the close relationship between my species and *caryæ* was recognized, but as Stal says that prothoracic horns are absent in *Microcentrus*, I looked for some other modern genus in which to locate, temporarily, the species. The Old World genus *Centruchus* seemed to fit it the best, and that generic term was used although there was an extra discoidal cell which must sooner or later place it in a separate genus. This has been done by Fowler, who has described the genus *Centruchoides*. Of the two species the neururation is identical, and the entire anatomy (other than the presence of lateral horns in *Liebeckii*) is the same. I have before me the example of *Liebeckii* mentioned by Prof. Baker as having aborted horns. In my collection is an example with horns still more aborted, and while in Washington a few weeks ago I found several similar examples in Mr. Heidemann's collection. That gentleman informed me that he had taken both forms together, with their larvæ and pupæ, while collecting. This shows that the horns are variable, and, as I believe, in some cases absent, as is true of *Platycotis sagittata*, Germ., as recorded in my paper "Fitch's types."

Mr. Fowler has re-described the genus *Microcentrus* as *Phaulocentrus*, and after stating that *caryæ*, Fh., belongs to his genus, describes and figures four new species, viz.: *pileatus*, *proximus*, *sordidus* and *cornutus*; the first three closely related to *caryæ*; the fourth, I believe, bears the same relation to one of the others that *Liebeckii* bears to *caryæ*, and I should not be surprised if his **Centruchoides laticornis* was still another instance.

In conclusion, I will say that the name *Ledra perdita*, in my opinion, should be forgotten. The type was destroyed; the description, which might apply to any one of a dozen species of *Centrotinæ*, drawn up from an unrecognizable figure, and there is no possible way of determining what insect the artist had in hand when he drew the figure from which Amyot and Serville drew up the description of *perdita*. Let the name be buried in oblivion. I believe *caryæ*, Fitch, and *Liebeckii*, Goding, are one and the same species. As Fitch's name has priority, the name *Microcentrus caryæ*, Fh., should stand, while the horned form may be known as *var. Liebeckii*, Godg.

* *Centruchoides* is not a MS. name. It is described in Fowler's work, page 159.

A PRINCIPLE TO OBSERVE IN NAMING GALLS: TWO
NEW GALL-MAKING DIPTERA.

BY WM. H. PATTON, HARTFORD, CONN.

ŒDASPIS-SOLIDAGO ATRA.

Galls do not differ from those of *Œ. polita*, as described by Osten Sacken (Tr. A. E. Soc. II., 301; 1869).

This is an addition to the list of gall-making Trypetas given by Osten Sacken in *Psyche* for April, 1880. I bred both sexes from Solidago galls, Sept. 8, 1875, in Connecticut.

Flies.—Female agrees perfectly with Loew's description of a specimen from New York. The eyes in the living flies are green, with two longitudinal purple stripes. The shed puparia are left in the galls, and are of a delicate texture and milk-white colour. The New York specimens from which *atra* was described approach *polita* in all their points of difference from the Mexican specimens. Whether the Mexican specimens belong to the same species is a question which does not concern us in determining the synonymy of *atra*. If the pale gray border of the wing cross-bands was darkened and one of the bristles on the lateral border of the front was lost (differences which might well arise with increased maturity of the specimens) we should have nothing to separate the species excepting the slightly greater divergency of the second and third bands, and it is probable that this greater divergency would disappear with the blackening of the gray borders. *Œ. atra* is a later name than *Œ. polita*.

CECIDOMYIA-CELTIS (new genus) DESERTA, new species.

Galls are hollow, elongate swellings of young twigs, from which emerge, about the first of June, single Cecidomyian flies from a perforation near the base. Length of gall one half inch to one inch.

On Hackberry (*Celtis occidentalis*); Orange, Connecticut.

The name describes the genus.

This gall I name and describe to illustrate a principle which may be useful in naming galls of which the makers are unknown. It does not seem proper to refer such galls to the genus of plants alone, as was done by the older botanists, nor to the genus of insects alone, as is at present the fashion, but to a combination of the two, thus: *Cynips-quercus*, *Cecidomyia-quercus*, *Cecidomyia-salix*, etc. All *Cynips* are, it is true, confined to *Quercus*, but it is the gall and not the insect for which I

propose this nomenclature ; besides, *Quercus* supports other genera of gall-makers. The combined generic name is in the nominative case and will not conflict with the many specific names which have been drawn from the plant and used in the genitive. In many cases the genitive of the plant genus has been used in combination with a specific name not derived from the plant, as *Cynips-quercus-futilis*. The suggestion made by Osten Sacken that in these cases the genitive or its initial (which is often all that is used) should be dropped seems worthy of being carried into effect, as this genitive appears in most cases to have been inserted by accident or error.

This nomenclature also has the advantage of not presenting the appearance of describing what is unknown ; it has no binding force of priority over the specific name of the insect when that is discovered. It has, however, a priority in the description of *galls*, and the specific name should be retained as the name of the *gall*, even though the insect should by chance receive a different name or it should prove not to belong to the genus under which the gall is described. It also has the advantages of simplicity and of conformity with medical usage in naming gall diseases of animals.

To exemplify the principle I name the following galls described in the 5th Rept. U. S. Ent. Comm :

- p. 612, 30, *C.-c. oviformis*.
- p. 613, 31, *C.-c. semenrumicis*.
- p. 613, 32, *C.-c. pubescens*.
- p. 613, 33, *C.-c. capsularis*.
- p. 614, 34, *C.-c. spiniformis*.

THYREOPUS ADVENUS (Sm.), PACK., A PROTECTOR OF THE ARMY WORM.—This species is an exception among burrowing wasps in being injurious to vegetation, as I have found it killing and carrying to its nest *Sarcophaga*, *Musca domestica*, and that enemy of the Army worm, *Belvosia unifasciata*. The wasp forms its small hillocks under the shelter of shade trees late in August, in Connecticut. In rainy summers its numbers are much reduced. *MiltoGRAMMA* pursues the wasp with felonious intent. The wasp may be destroyed by pouring strong alkaline washes into the burrows.

The *B. unifasciata* varies in having a red tail, contrary to the name *flavicauda* by which it was formerly known. W. H. PATTON.

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NOTES ON THE LIFE HISTORY OF COLIAS INTERIOR, SCUD.

BY H. H. LYMAN, MONTREAL.

When in New York, towards the end of May, 1894, I paid a visit to Mr. B. Neumögen, who, though suffering considerably from the fatal disease to which, after a brave fight, he finally succumbed, received me kindly, and after a short conversation sent me upstairs to Mr. Doll to get the names of certain species which I had brought for determination.

In one of the drawers which Mr. Doll showed me I found several specimens of *Colias Interior*, one being of a very rich shade of colouring, almost orange, in fact. Asking where they came from, I learned that they had been taken the previous season at Camp Lou, on Osgood Pond, in the Adirondacks, and I immediately determined, if possible, to get eggs. Early in July I wrote to Mr. Neumögen to ascertain the best time to be on the happy hunting-grounds and for any suggestions, and received a post card, dated 9th July, written on a railway train, and the last communication I received from him, telling me that then was the right time. I was unable to go just then, but on the 20th I left by the evening train over the Adirondack and St. Lawrence Railway, and reached Paul Smith's hotel shortly after 9 o'clock. The 21st it rained all day till late in the afternoon, but the 22nd was fine, and I soon had 2 ♀ ♀ of *Interior* caged for eggs. For the cage I used a tomato can filled with such soil, chiefly sand, as I could find, and in it I placed two species of *Vaccinium*, two willows, *Kalmia Augustifolia*, *Trifolium Stoloniferum*. The following day I took five more females and two males. One ♂ *Philodice* was taken courting a ♀ *Interior*, and was confined with the ♀ ♀ to see if it would copulate with one of them, but it did not do so, so far as I observed. Three of the freshest ♀ ♀ were killed for the cabinet, but the remaining four with 1 ♂ *Interior* and the ♂ *Philodice* were kept caged. The 24th was again rainy, and in the afternoon I left for home, carrying my menagerie with me. On the 26th July the plants were changed to a flowerpot of larger size than the tomato can, and the following species of plants were added: *Melilotus Officinalis* and *Alba*, *Amphicarpæa Monoica*,

Vicia Cracca, *Desmodium Dellenii*. One ♀ was found dead, and one very feeble and apparently dying. The living ones were fed with sugar and water, and here I may be permitted to say that the only success I have ever had in feeding butterflies was when I uncoiled their tongues with a pin bent at the point, and then put a camel's-hair pencil dipped in the syrup to the tongue. They will then continue to feed as long as they are hungry; but holding the brush in front of them and blowing gently towards them, as the authorities tell us to do, I have found a failure, and putting a saturated sponge in a cage utterly useless. No eggs were observed at this time, but one at least must have been laid some time before, as a larva hatched on 30th. On the 29th I was ill in bed all day, but on the 30th I found that from 28 to 30 eggs had been laid, nearly all on the *Vaccinium*, and that one larva had hatched as above stated. One egg was laid on *Amphicarpæa Monoica*. One or two eggs were laid after the 30th. I divided about half of the eggs between Messrs. Fletcher and Scudder, sending eight to the former and six to the latter.

Of the eggs that I kept, one hatched on 30th July, four on 4th August, eight on 5th, and two on 6th. The egg period must therefore have been about six or possibly seven days in one or two instances.

The egg and first stage of the larva have been described by Mr. Scudder in his great work on butterflies, but as that work is unfortunately not available to all entomologists, it will do no harm if I give my notes, imperfect as they may be, in full.

Egg.—Length, $1\frac{2}{3}$ mm.; diameter, .48 mm. Similar to *Philodice* in shape. Number of ribs, about 20. At first, white tinged with greenish-yellow, soon turning reddish-orange. Just before hatching turning dark. The larva can then be seen through the shell, standing on its tail, with a clear, vacant space above the black head. The larva emerges a little below the top, just where the head is. One that was watched crawled slowly down the shell on to the leaf, moving its head from side to side on the leaf as though spinning a silken path, and as soon as it was all on the leaf, it turned round, climbed to the top of the shell, and began to devour it, and ate it all up, its meal taking 40 minutes. Most of the larvæ did not eat more than half of the shell, and some did not eat any.

Young larva.—Length, 1.91 mm.; width of head, .366 mm.; head black, the hairs pellucid. Body brownish-green, finely transversely striated, with about five striations to each segment. Skin faintly shagreened with yellowish-brown; the striations are of same colour; the raised points

are pale in colour, black at the summit. Hairs pellucid, club-shaped, especially on second segment, where they are considerably longer than on the other segments.

Tried the larvæ with *Vaccinium*, two or three species of birch, two or three species of willow, *Amphicarpæa Monoica*, *Epilobium Augustifolium*, and several other plants at a venture, but in all cases they crawled off the leaves on to the side of the jar. One that was afterwards placed upon a willow leaf just died and dried up where it was put. On 5th August found the leaves of *Vaccinium* eaten in several small patches, and a sprinkling of tiny frass in the bottom of the tumbler. All the larvæ behaved as though *Vaccinium* were not their proper food plant, leaving it and wandering around the glass, and only returning to it when they found that they could not get anything more to their taste. I have, however, since then, seen the same thing done by the larvæ of a Noctuid, the eggs of which were found on the leaves of a shrub, and I therefore judge that it is owing either to a desire to explore their surroundings or because they object to the confinement. The frass from the young larvæ must have been ejected with considerable force, as the jar was always sprinkled half way up the side. The mortality, through drying up apparently, was very heavy, and by the 15th of the month only five remained out of fifteen, and in my despair I wrote to Mr. Scudder for suggestions, and on the 17th received an answer from him describing his method of unconfined feeding. I then filled a homœopathic vial with water, bored a small hole in the cork, and inserted a small sprig of *Vaccinium*. The vial I placed in a wineglass, with earth around it to support it, in order that should the larvæ fall off the leaves they would be caught, and also to decrease the danger of their straying. The earth I watered, so as to render the air about the larvæ slightly moist. I then transferred all that remained alive, viz., three, as two had perished since the 15th, to the sprig. The following day I found that one had not moved from the spot where I placed it, and was apparently dead and drying up, but the two others were healthy, and thenceforward I had no trouble, and carried these two right through to imago. One of these larvæ passed first moult on 18th August, and the second on the 20th. Just before the moult the larva seems quite smooth.

After first moult: Length about 3.9 mm., rather plump, colour dull green, head same colour as body, head and body covered with very short, minute whitish hairs, giving a shagreened appearance; faint, darker green longitudinal lines are visible under a lens.

On the 20th I left for a short holiday at Murray Bay, carrying my menagerie with me, and my arrival with it caused a certain amount of curious interest among the guests at the hotel. The larva eats the parenchyma of the leaf in small round patches; mine fed on the upper side, and when resting, they rested along the midrib, head sometimes up and sometimes down. Mr. Scudder tried his larvæ with *Vaccinium Corymbosum* and *V. Vacillans*, and found that the one on the latter ate with twice the zest of that on the *Corymbosum*, and further, that the one on the latter fed on the upper surface of the leaf, while that on *Vacillans* fed on the lower surface.

About the end of August or first of September they ceased feeding and became lethargic, lying along the midrib of the leaf, near the petiole, upon a slight carpet of silk, and as they were plainly hibernating, and I feared they might dry up, I removed the leaves from the sprig, cut away the surplus space of the leaves, and secured them to the bottom of a pill-box with a touch of glue. When the pieces of leaf seemed perfectly dry, I put the pill-box in a bottle, corked it and placed it in the refrigerator. Some time afterwards I found that in some way water had got into the bottle, and the card pill-box was wet and mouldy. I took it out, removed the mould as well as possible with a camel's-hair pencil, and allowed the box to dry. The larvæ were apparently healthy, and I then put the box out of doors on a gallery, where the occupants would be as cool as possible and protected from sun and rain.

As soon as the snow came I got a small wooden box, cut several small pieces about an inch square out of the upper edge for ventilating purposes, put it on the ground, with a brick on the bottom inside, placed my box with hibernating larvæ on the brick, and covered the box with an inverted tin tray that I had had made, the tray projecting about an inch all around the box, and then covered it with snow. In the spring, as the snow gradually melted, I had more brought from the shady parts of the garden to pile over the box, and finally had the much-reduced heap covered with ashes to protect what little snow remained from the genial warmth of the end of April. I wrote to Mr. W. H. Edwards to try to secure some *Vaccinium* from the South, offering to pay a boy to get it, but Mr. Edwards wrote that he did not know where to get it, and advised me to try willow. I then appealed to Mr. Jack, at Jamaica Plain, and a few days later to Mr. Fletcher, at Ottawa. Both kindly responded promptly, and as a result I received a plentiful supply of shoots with the first tiny

leaves coming out. The snow and ashes were removed from the top of the box on 1st May, and the box opened. The card pill-boxes were found very damp and mouldy, but the two larvæ were sound and healthy in spite of the mould all about them, but were naturally somewhat shrunken in size from their long fast.

At midday, on 3rd May, as I found that they had moved from their positions, I placed them very carefully upon the open buds of a sprig of *Vaccinium*, arranged in water as previously. They soon crawled on to the stem and rested, one head down, the other up.

During the 4th they remained lethargic, in the same position, but by the morning of the 5th the one which previously had its head up had turned round and had its head down, and by the evening I found that they had eaten a little. They now eat the entire leaf, which is young and tender.

On 9th May they moulted for second time.

After 2nd moult. — Length, about 7 mm. Head green, slightly roughened with minute brown points. Body green, with many minute yellowish raised spots, each tipped with a minute brown hair or point. Along the spiracular space there is a raised band like a fold, mottled with white, pink and yellowish.

On 12th May one passed 3rd moult about 3.30 p.m. while under observation. When first seen the old face still adhered to the mouth-parts of the new, but the skin had been worked more than half way to the anal extremity. It only took a very few minutes to get clear of the old skin, and then it proceeded to divest itself of the old face, which it soon accomplished.

After 3rd moult. — Length at rest, 8.6 mm. Head bright green, roughened as before. Body darker green, shagreened with yellowish raised spots, with short brown hairs or points. Spiracular fold as before, whitish, with orange and yellowish patches and markings.

The weather turned cold and wet, and the second larva was two or three days later in moulting than the other, but the exact date was not recorded.

The species of *Vaccinium* that Mr. Fletcher supplied me with was *Canadense*, but I had also received *V. Vacillans* from Mr. Jack. On the 17th a careless servant threw away my supply of *V. Canadense*, so I gave the larvæ the *V. Vacillans*, but the following day I found they had refused it and had eaten nothing, so I offered them some of the sprigs that I had

first received with the opening buds which I had kept in a tin, and they then began to feed eagerly upon these. The arrival of a fresh supply of *V. Canadense* from Mr. Fletcher removed all cause for anxiety.

On 25th May both were observed to be apparently fixed for 4th moult. Length as contracted, 14 mm. The spiracular fold is pink, bordered with white and interrupted by the spiracles, which show as a green oval ring on the white band with a white centre. There is no trace of any pink or other stripe above or below the spiracular one. There is a dark green dorsal line, and the space on each side of it has a yellowish-green appearance from the minute yellowish warts, but the subdorsal or lateral region is of a bluish-green shade, and the warts are whitish. The region above the spiracular fold is thus about evenly divided between bluish and yellowish green.

One was found, about 10.45 a. m., on 26th May, to have passed 4th moult, and was described at 1 p m.

After 4th moult.—Length at rest, 16 mm. Head and second segment bright green, finely sprinkled with black points, from which arise minute hairs, blackish above, whitish below. Dorsal region green, with a brownish-yellow tinge, as before. Lateral and sub-spiracular regions bluish or whitish green, the minute hairs being whitish. Spiracular fold white, overlaid along the middle with coral-red. On following morning the other larva had passed 4th moult, and on 31st the former was apparently mature, as it left its food and crawled up to top of cage. I described it in the afternoon, but it was very restless, sometimes crawling very fast, and sometimes in a very funny, jerky manner.

Mature larva.—Length, 25 mm. Rich dark yellowish-green on head and above, with narrow dorsal dark stripe bluish-green on sides, with innumerable small papillæ and minute hairs of a dark brown or black colour above, partly white on sides, and white below spiracular fold. Spiracular fold white, with bright crimson stripe included. Head small; as finely dotted as the body. Below bright green; feet and prolegs the same.

Mr. Fletcher kindly gave me the following note on the general habits of the larva:

“Larva decidedly sluggish for the greater part of the time, but when feeding, which was generally twice a day, very nervously active, biting with great rapidity, and moving slowly with short, jerky steps.”

The following particulars are also taken from Mr. Fletcher's notes on the mature larva:

"Length, $1\frac{3}{8}$ inches when extended feeding. Head, 2 mm. broad; narrower than segment 2. Segment 3 slightly the widest of all. Body cylindrical from 4 to 10 inclusive, then tapering slightly to end. Head concolorous with body, evenly reticulated all over with dark green, the interspaces yellowish and pubescent, the bristles on apex short and black, those toward the mouth much longer and white. Mandibles darkened at apex, process beneath the neck honey-coloured. Ocelli six, in two lines, the anterior of 4 slightly curved forward and lying on a yellowish-white stripe, the other two lying behind these, one above the other, smaller than those of the anterior row. In the anterior row the 2nd and 3rd are the largest, all blackened at base, vitreous at apex. No. 1 of posterior series is the smallest and least conspicuous."

On 1st June one fixed for pupation, and the other on 2nd. Pupation occurred on 3rd June.

Chrysalis very similar to that of *Philodice*. Green, vermiculate with yellowish-white markings over upper part of thorax and all the abdomen, giving a pea green effect. A green dorsal line extends the whole length. When first formed, there is a spiracular band, similar to that of the larva, running from the wing-case to the tail, but the crimson soon disappears, and the band becomes yellowish and inconspicuous. Half way between the band and the ventral surface there is a broken reddish-brown stripe on the first three abdominal segments, beyond the wing-covers. The head is marked with darker green, yellowish-white at apex. The girdle is rather long, and the chrysalis hangs loose from its support. Length of chrysalis, 18.7 mm.; greatest thickness, 6 mm.

On 12th June the antennæ cases were crimson, tipped with yellowish-green, and the outer and apical margins of the wing-covers were the same. All the parts between the antennæ cases were brownish-green, the eyes deep green, the ventral half of the abdomen yellowish, the wings greenish-yellow. While I was describing it, it bent itself from side to side, bending the abdominal joints as much as possible.

Both pupæ disclosed the imago on afternoon of 13th; the chrysalis stage being thus ten days. Both were males. I had intended sending away one larva to have a coloured drawing made of it when mature, and of the chrysalis when formed, but my ones matured so fast that I was too late for this, so appealed to Mr. Fletcher to send his one specimen, which had lagged a little behind mine in development. He very kindly acquiesced, but, unfortunately, the larva pupated in the mail, with fatal

result. From the length of the larva, $1\frac{3}{8}$ inches, he judged that it was a female. The form of the species which occurs in the Adirondacks is that with yellow female, but what that form should be called is a matter of some doubt. In Mr. Scudder's "Butterflies of New England," page 1107, he suggests that as this form was first described when the species was re-described by him, under the name *Eurymus Philodice*, var. *Laurentina*, it should be designated by the trinomial appellation, *Eurymus Interior Laurentina*, the pallid, or white, female being called *Eurymus Interior Interior*. But it seems to me that the doctrine of priority of description cannot govern the matter in the case of a variety, else we may have what is the normal form in nature labelled as the abnormal in our cabinets, and the abnormal variety of nature standing as the normal form in our cabinets. Clearly, where there is dimorphism in one sex of a species, the form which predominates in a marked degree must be considered the normal form, and the other the varietal, all original descriptions to the contrary notwithstanding. Priority must rule in regard to the species, but it must give way where it clashes with nature in regard to varieties.

The question, then, to be settled, is what is the predominating form of the female in this species? Possibly at present the material in cabinets may not be sufficient to settle the matter authoritatively, but I believe it will be found that the yellow or syngenic form is the normal form, and that the antigenic or pallid female is only an albinic form, as in *Philodice*.

Among the types of *Interior* there was only one female, and this happened to be of the pallid form described by Mr. Scudder as "white, with a very pale yellowish tinge"; but among the large number brought from Cape Breton Island by Mr. Roland Thaxter there were eight pallid females, and ten which Mr. Scudder called gynandromorphic females, by which not very happy term, I suppose he designated the yellow form.

Besides the seven females taken by me in the Adirondacks and the three from the same region that I saw in Mr. Neumægen's collection, I have one from the *Godbout river, in the Gulf of St. Lawrence, and one from Nepigon, and all these are yellow, and I do not remember having ever seen a white one, though it is possible I may have done so. Dr. Bethune has informed me that he took a good many at Nepigon, and all were yellow. Mr. Fletcher wrote me that he had taken 18 ♀♀ at Nepigon, and of these 11 were of what he calls the pallid form, and 3 at

*The man who collected for Mr. Couper at this locality was named Comeau, not Corneau, as printed in the CAN. ENT.

Ottawa, of which one was pale, and that Prof. Macoun took 3 ♀♀, all yellow, in Prince Edward Island; but I do not think Mr. Fletcher has ever had a white female Interior. Mr. Fletcher has also one ♀ of the yellow form from British Columbia. If my belief in this matter should prove to be well founded, the species should simply be known as *Colias Interior* with an albinic variety of the female, and the name *Laurentina* should simply fall into the synonymy.

Mr. Scudder further says that "the males are very much more numerous than the females," and among his "desiderata" asks why this is so.

On general principles I should think such a condition of things extremely doubtful, and I believe Mr. Scudder's assertion to be founded on insufficient evidence, especially as in the collection which Mr. Roland Thaxter made in Cape Breton, and which furnished Mr. Scudder with his types of *C. Laurentina*, there were 18 females to 21 males, certainly no great discrepancy.

I have only twice met with this species in numbers, but neither experience would lead me to form such an opinion. The first occasion was on 8th July, 1890, along the line of the C. P. R. west of Sudbury, when travelling to Nepigon in company with Mr. Fletcher. Whenever the train stopped for a minute or two we jumped off with our nets, and I think we took a dozen between us, and I believe all were males, but it was evidently too early for the females, as the males were quite fresh, and the next day when we arrived at Nepigon, where the season is later, we found that the males had not yet appeared. I think it probable that a fortnight later plenty of females would have been flying near Sudbury.

I may say, however, that the evidence of Mr. John D. Evans, of Trenton, who collected for a number of years at Sudbury, is rather on the other side, as out of a series of 31 specimens in his collection only 4 are females. This is probably accounted for by the fact that out of the 31 no less than 19 were taken prior to July 5th, and for 4 others the date of capture is unknown, and I have already pointed out that the females probably appear later. Twenty-one out of the 31 were taken by Mr. Evans in 1886, who found this species comparatively scarce in later years.

In 1894, at Paul Smith's, I took seven females to two males, but, of course, the former are easier of capture. When this matter has been further investigated, I am confident it will be found that no serious

discrepancy in numbers exists between the sexes. In speaking of the probable or possible life history of the species, Mr. Scudder says (page 1110): "Mr. Fletcher obtained them (the eggs) July 16-24, and they hatch in seven days. This gives ample time for the caterpillars to attain maturity and pass into pupa for the winter; but what the creatures actually do, and how winter is passed, is unknown. There is, however, certainly but one brood anywhere." It seems to me, however, that it may be mathematically demonstrated that any species of which there is only one brood in the year and which does not appear on the wing till July or the very end of June must pass the winter in the larval condition not more than half-grown.

THE LIFE HISTORY OF *EPIRRANTHIS OBFIRMARIA*, HBN.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Epirranthis obfirmaria is a swamp insect. I take it in "The Gomin" near Quebec, where, in ordinary seasons, it is on the wing from early in June till the close of that month. The following is a brief description of this beautiful insect:

♂. Expanse of wings one inch; length of body half an inch; length of antennæ three-tenths of an inch. Colour a rich, warm brown. The primaries have a broad ochreous band, widest at the costa, outlined with dark brown. In this band, not far from the costa, is a dark brown spot. The secondaries have the outer third of the same warm brown as the primaries, with an ochreous patch at the outer angle of it. The rest of the wing is ochreous, clouded towards the base. The marginal dark brown line of this ochreous portion is somewhat angulated. In the part of lightest colour in the wing is a conspicuous dark brown spot. The antennæ are pectinated.

♀. Expanse of wings an inch and one-fifth; length of body nine-twentieths of an inch; length of antennæ two-fifths of an inch. The marks in the wings are similar to those in the wings of the male, except that there are no brown dots in the primaries. The colours are much brighter: the darker portions are of a rich brick-red, and the lighter of a clearer yellow than in the male. The brown spots in the secondaries are small. The antennæ are filiform.

Eggs of E. obfirmaria.

The eggs of *E. obfirmaria* are laid dispersedly and unattached. They are pale greenish-yellow, small, and bluntly oval in outline. They

have minute granulations on the surface. A batch of the eggs, laid on the 14th of June in the present year, hatched on the 27th of the same month. The larvæ fed on *Vaccinium*, *Cassandra*, etc.

Newly-hatched larva.

A "looper," one-tenth of an inch long, suspended itself by a line. It was black with white patches on each segment, and presented a strangely checkered appearance. The head was large and black; the mouth-organs white. The feet also were white. The claspers were wide apart—beside them it had but one pair of prolegs. There were a few bristles at the anal extremity, and along the sides of the larva. It moulted July 3rd.

Larva after first moult.

One fourth of an inch long; brownish-green in colour; had five conspicuous brown warts on each side of the body. The head was light brown, and the legs brownish-green.

[NOTE.—The habit the larva has of eating its *exuvie* makes it exceedingly difficult to follow its changes. The insect I am telling of, however, certainly moulted on July 16th.]

Larva after moult of July 16th.

Length three-fifths of an inch. Colour brownish-ash above, with fine paler lines. The fourth and terminal segments were somewhat lighter in colour. Underneath the larva was of an Indian yellow shade. The face was flat, outlined with brown, and had two white spots near the upper edge. The spiracles were dark brown and appeared in a line of folds or broken ridges. The larva moulted July 24th. After moulting it ate its old skin all but the mask.

Full-grown larva.

Length four-fifths of an inch. Colour brownish-ochreous. It had a dorsal line faintly outlined with brown, and on either side of this a row of dark brown spots. It had also a row of similar spots just above the spiracular line. This line was pale ochreous and warty. Below it was a row of oblong, dark brown patches. The spiracles were dark brown.

The larva ceased to feed in August, and towards the middle of that month gathered a few leaves together and spun a light cocoon somewhat after the manner of *Caterva catenaria*.

DESCRIPTIONS OF FIVE NEW GENERA IN THE FAMILY
CYNIPIDÆ.BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS,
U. S. NATIONAL MUSEUM.

Subfamily VIII.—CYNIPINÆ.

XYSTOTERAS, gen. nov.

This new genus somewhat resembles *Philonix*, Fitch (= *Acraspis*, Mayr), and agrees with it in having 14-jointed antennæ, but otherwise is quite different. The head, thorax and abdomen are highly polished, impunctate, the mesonotum being entirely without any trace of the parapsidal furrows, and in this character differing widely from all other of the agamous genera of the Cynipinæ. The absence of the parapsidal furrows being peculiar only to the sexual genera *Neuroterus* (Ameristus, Förster) and *Dolichostrophus*, Ashmead. The third joint of the antennæ is not quite as long as joints 1 and 2 or 3 and 4 united, joints 10-13 a little longer than thick, while the last joint is fusiform, a little longer than the penultimate. The scutellum has a depression across its base, but is without distinct foveæ, and is also not separated from the base of the mesonotum by a delicate grooved line; apically it is obtusely rounded, shagreened and somewhat densely pubescent. The mesopleura have a large, rather deep vertical femoral impression. The wings are represented by very short pads which do not extend beyond the apex of the metathorax or just reach to base of abdomen. The abdomen is about twice as long as the head and thorax united, polished, bare; the second segment dorsally occupies about half the whole surface; the third segment dorsally is not quite as long as segments 4 and 5 united; the segments 4-7 subequal; while the hypopygium terminates in a long, pubescent spine. The hind tarsi are as long as their tibiæ, the claws being simple.

Xystoteras volutellæ, sp. n.

Gall.—A conical, bluish-gray gall, from 3 to 3.5 mm. high, by 2.5 mm. in diameter at base; occurring singly or in great numbers on the under surface of the leaves of *Quercus macrocarpa* in Riley County, Kansas. The top of the gall is truncate and internally it is hollow, with the larval cell or kernel, resembling a minute nipple, situated at its base. The gall is attached to the leaf by a few fibres and may easily be detached. The colour of the gall is produced by a powdery or pruinose bloom which completely covers it when fresh.

Gall-wasp.—♀. Length 2 mm. Polished black, very sparsely pubescent. Antennæ 14-jointed, about two-thirds the length of the body, the first joint or scape obconical, slightly curved, swollen at tip, the second joint about $1\frac{1}{2}$ times as long as thick, both much stouter than the flagellum. Mesopleura smooth, shining, with a deep vertical femoral fovea. Legs, except knees or the extreme apices of the femora, which are dull honey-yellow, entirely black.

Hab. —Manhattan, Riley County, Kansas.

Described from a single specimen received nearly ten years ago from Mr. C. L. Marlatt. The wasp, according to Mr. Marlatt, issues from the gall early in January.

ZOPHEROTERAS, gen. nov.

This genus also comes very close to *Philonix*, Fitch, but is readily separated from it by the shape of the scutellum, by antennal characters, by bareness of abdomen, and by the claws of the hind tarsi being simple, not toothed.

The frons and mesonotum are alutaceous or feebly shagreened, the latter having distinct traces of the parapsidal furrows, or at least these are more or less distinct posteriorly. The scutellum is rounded or semi-circular, rounded off posteriorly and separated from the mesonotum by a delicate grooved line and carina. The antennæ are long, 14-jointed, the third joint as long or nearly as long as joints 4 and 5 united; joints 6–13 are a little more than twice as long as thick. Claws of hind tarsi simple. The abdomen is longer than the head and thorax united, bare, or at the most with only some sparse pubescence at sides towards the base; the second segment dorsally occupies fully half the whole surface; segments 3–5 short, subequal; segments 6 and 7 very short; while the hypopygium is armed with a hairy spine.

To this genus belongs *Acraspis vaccinii*, Ashm.

XANTHOTERAS, gen. nov.

Head shagreened, the frons without a distinct ridge or carina between the antennæ. Mesonotum polished, with deep, distinct parapsidal furrows. Scutellum with more or less distinct lateral margins or with a frenum, two indistinct shallow foveæ at base and the same separated from the base of the mesonotum by a delicate but distinct transverse grooved line and a carina. Antennæ 14-jointed, the third joint a little longer than the fourth, or the latter about two-thirds the length of the third; joints

7-14 a little stouter than joints 2 to 6, and much shorter, joints 11-13 being hardly longer than wide. Tarsi shorter than their tibiæ, the claws with a tooth within.

This genus, although closely allied to *Biorrhiza*, Westw., is readily separated by the absence of the middle frontal ridge between the antennæ, by the shape of the scutellum and by the claws having a tooth within.

The type of the genus is *Biorrhiza forticornis*, Walsh.

PARATERAS, gen. nov.

Last joint of labial palpi somewhat enlarged, ovate. Antennæ 14-jointed, the third joint long, but much shorter than joints 4-5 united, joints 11-13 scarcely twice as long as thick, the last joint hardly so long as the two preceding united. Head and thorax alutaceous or finely shagreened, the mesopleura finely delicately sculptured, without a femoral fovea. Mesonotum with two distinct parapsidal furrows which converge and meet at base of the scutellum. Scutellum small, highly convex or elevated, with a distinct tranverse fovea at base (in reality two foveæ united). The hind tarsi are longer than their tibiæ, the claws with a distinct tooth at base beneath. Abdomen polished, bare. This genus comes nearest to *Spheroteras*, Ashm., but is readily separated by having 14-jointed, not 13-jointed, antennæ, by the scutellum having a fovea or foveæ at base, and by the hind tarsi being longer, not shorter, than their tibiæ.

Parateras Hubbardi, sp. n.

Agamous ♀.—Length 2 mm. Head and thorax reddish-brown, the vertex and scutellum somewhat obfuscated. Abdomen black, piceous towards base. Antennæ with the first two joints ferruginous, dusky above, the flagellum black or brown-black, except first joint basally. Legs, including coxæ, pale ferruginous, with all the tibiæ, or at least outwardly, dark fuscous or blackish, the tarsi more or less fuscous. Abdomen with the second segment not quite occupying half the whole surface, the third segment dorsally not quite as long as four and five united, the fifth about two-thirds the length of the fourth, the following segments retracted.

Hab.—Detroit, Michigan.

Described from two specimens received from Mr. H. G. Hubbard, to whom the species is dedicated.

ASCLEPIADIPHILA, gen. nov.

This new genus comes very close to *Antistrophus*, Walsh, and might easily be confused with it, since it agrees with it in all particulars except as follows :

The female antennæ are 13-jointed, not 14-jointed, the third joint being shorter than the fourth ; in the male the antennæ are 14 jointed, not 15-jointed. The second abdominal segment occupies fully two-thirds the whole surface, while in *Antistrophus* the second segment is considerably shorter.

Asclepiadiphila stephanotidis, sp. n.

Gall.—A small, rounded or pea-like gall averaging from 6 to 8 mm. in diameter, growing from the stems of a species of *Stephanotis*. Externally it is opaque and varies from a gray to a brownish colour, while internally it is whitish and composed of a dense pithy substance with a single larval cell in the centre.

Gall-wasp.—♀. Length 3 mm. Head, thorax and legs reddish-brown, the sutures of the thorax dusky, the mesonotum with a dark streak down the middle, while the middle and hind tarsi are more or less obfuscated. Antennæ 13-jointed, brown. Abdomen black, highly polished. Wings hyaline, the veins pale yellowish ; the first branch of the radius is straight or nearly so ; areolet entirely wanting, the tranverse cubitus about two-thirds the length of the first abscissa of the radius, the first branch of the cubitus very delicate, indistinct, and originating from about the basal third of the basal nervure.

♂.—Length 2.6 mm. Black ; tips of femora and more or less of anterior and middle tibiæ basally dark honey-yellow, rest of legs black. Antennæ 14-jointed, the scape and pedicel black, the flagellum brown.

Hab.—Oregon, Missouri.

Types, No. 3737, U. S. N. M.

A NEW FOOD PLANT FOR PAPILIO ASTERIAS.

BY G. H. FRENCH, CARBONDALE, ILL.

A few days ago I received a letter from Mr. A. V. Thomsen, Chicago, giving a new food plant for *Papilio Asterias*. But I can give it best by quoting part of Mr. Thomsen's letter. He says :

"Having made a very interesting observation in my study of Lepidoptera, I herewith enclose the notes regarding the same. Aug. 26, '97, I received from Mr. Higgins, in charge of Dept. of Hardy Perennials

and Wild Flowers, Lincoln Park, four larvæ of *Papilio Asterias*, nearly full-fed. Found on *Ruta Graveolens* (English Rue). These larvæ pupated as follows: One on Sept. 4, three on Sept. 7. On Sept. 13, '97, I received from the same source eight larvæ of *P. Asterias* in third, fourth and full-fed stages. One pupated Sept. 16. Two of these were found on *Ruta Graveolens*, the balance on *Feniculum officinale* (common Fennel). Now, I have never seen nor heard of any previous records of *P. Asterias* being found on anything else than members of the Umbelliferae, and I consider it a very strange occurrence that they should choose a family so widely separated from the Umbelliferae as the Rutaceae, of which *Ruta Graveolens* is the type.

"If it had been *Papilio Cresphontes* which I had found upon that plant I should not have wondered, as its food plants here are *Xanthoxylum* and *Ptelea*, two of the Rutaceae, but *P. Asterias*!"

I should like to ask here if any one has found *Papilio Philenor* feeding on anything but *Aristolochia*? The species of this genus are rare here, but the butterfly is rather common.

ANOTHER NEW SPECIES OF PROTANDRENA, CKILL.

BY S. N. DUNNING, HARTFORD, CONN.

Protandrena Bancrofti, n. sp.

♀.—Length 9–11 mm.; not as stout as *Cockerelli*, Dun.; a few gray hairs on face and cheeks and on under side of thorax, hair bands on seg. 2–3–4, seg. 5–6 covered with hair growing rufous towards tip, legs and venter with sparse rather longer hairs; black except a T-shaped mark resting against upper edge of clypeus, spot on tegulae, tubercles, and four anterior knees which are pale yellow. Head subquadrate, broader than high, venter with fairly deep, not close, punctures; clypeal and sub-clypeal punctures larger and shallow, mandibles piceous; antennæ black at base, growing brownish towards tip, 1st jt. flagellum not as long as 2nd and 3rd combined. Mesothorax deeply and closely punctured; scutellum with large, coarse punctures; post-scutellum not smooth, shining; metathorax with a smooth, shining spot on upper lateral angles, closely and finely punctured, a narrow suture extending upwards. Abdomen finely and closely punctured; venter with large shallow punctures. Wings subhyaline, much darkened outwardly (very much more so than in *Cockerelli*); stigma and nervures ferruginous, a light spot before the stigma.

Two specimens (D. 1102, July 6, 1897, on *Solanum rostratum*; D. 1262, July 11, '97, on *Medicago sativa*, or alfalfa) taken on the Bancroft Farm, near Denver, Colo. One has been deposited with the American Entomological Society.

SOME NEW AND LITTLE-KNOWN COCCIDÆ COLLECTED
BY PROF. C. H. T. TOWNSEND IN MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The Coccidæ herein described were collected by Prof. Townsend in 1896, and kindly transmitted to me for study by Dr. L. O. Howard. The collection made by Prof. Townsend will be fully enumerated in a paper to be published by him elsewhere, so the present contribution is confined to descriptions of the new species and descriptive notes on one hitherto imperfectly known. I have also included the description of a new variety of *Comstockiella* from Mexico, not found by Townsend.

(1.) *Aspidiotus reniformis*, n. sp.—♀ scale circular, diam. 2 mm., flat, pale reddish-brown; exuviae concolorous or slightly darker, covered, but both skins very distinctly visible, large, laterad of the middle. First skin when rubbed shining coppery.

♀.—Reniform, yellow with a brown margin; the posterior portion large, pale yellow, projecting with the outline of a cone, unusually produced and narrow, the sides meeting at less than a right angle. Pygidium (so-called) minutely striate; anal orifice oval or subtriangular, a long distance from hind end. Four very small low broad inconspicuous lobes, the plates between them scarcely visible; these lobes are twice as broad as long, the second about or nearly as broad as the first. Immediately cephalad of the second lobe comes a pair of small diverging spinelike plates; then after an interval somewhat greater (sometimes less) than the distance from the hind end to the plates just mentioned, comes a depression in which is a larger, but still small, pair of diverging spinelike plates, beyond this the margin is distinctly but very minutely serrate, with three small pointed prominences at rather long intervals, and a small rounded notch about half way between the first of these and the largest plates.

There are long tubular glands opening at the bases of the lobes, and also at the place of the obsolete third lobe; these are three on each side, with others, shorter and smaller, between them. Caudolateral grouped glands a long distance cephalad of the anal orifice. Four groups of ventral glands, caudolaterals 4 to 7, cephalolaterals 8. The antennæ are represented by small tubercles, each emitting a bristle. On each side of the mouth, some distance from it, is a small reniform orifice, its convexity directed laterad.

Hab.—Numerous on under sides of entire, lanceolate leaves, about 60 mm. long. Tehuantepec City, Mexico, May 26th (Townsend; Div.

Ent., No. 7196). This is related to the subgenus *Chrysomphalus*, and comes nearest to *A. perseæ*, Comstock. It resembles *A. mimosæ* in some respects, but the tubular glands are much longer than in that species, or in *smilacis*. The scale might be taken, at a superficial glance, for *amantii*, *dictyospermi*, or one of the *uvæ* group, all of which are quite different structurally.

(2.) *Aspidiotus (Hemiberlesia) tricolor*, n. sp.—♀ scales $1\frac{2}{3}$ mm. diam., crowded on twig, approximately circular, very little convex, white with a brownish stain; exuviae central or sublateral, covered by a film of secretion, appearing as a blackish spot; first skin in many examples uncovered, black or dark brown; second skin rarely uncovered, deep orange. Removed from the twigs, the scales leave a whitish film, quite conspicuous.

♀.—Circular, orange-brown. Only a single pair of lobes, these very large, entire, broad and low, much broader than long, gently rounded at ends, shaped like the end of an axe-blade; separated by a pair of well-developed spinelike plates. On the margin cephalad of the lobes is a group of five more or less serrate spinelike plates; then come three very short spinelike plates, after which the margin is more or less, irregularly, crenate. Anal orifice large, oval, distant from bases of median lobes less (sometimes a little more) than its own length. No groups of ventral glands. A few oval glands marking the lines of the obsolete segments. Two small saccular incisions with thickened edges on each side, one immediately laterad of the median lobe, the other cephalad (or laterad) of the obsolete second lobe.

Hab.—Salina Cruz, Mexico, May 29th (Townsend: Div. Ent., No. 7193). Distinguished by its very broad entire lobes, and the orange second skin. It will form with *A. rapax*, Comstock, and *A. ulmi*, W. G. Johnson, a little group, to which the name *Aspidites* is applicable, thus:

Subg. *Aspidites*, Berlese and Leonardi, 1896, s. str.—Scale white or whitish, no groups of ventral glands, only one pair of lobes.

Exuviae black or at least very dark..... *rapax*.

First skin black or very dark, second orange.. *tricolor*.

Exuviae wholly orange-yellow..... *ulmi*.

A. rapax is the type of *Aspidites*. *A. perniciosus*, *tenebricosus* and *smilacis*, included in it by Berlese and Leonardi, are not closely related to *rapax*, and should be placed elsewhere. [Since writing the above I have

found that *Aspidites* was proposed by Waagen in 1895 for a genus of Cephalopoda; *Aspidites*, Berl. & Leon., may therefore be changed to *Hemiberlesia*.]

(3.) *Diaspis persimilis*, n. sp.—♀ scale about $1\frac{1}{2}$ mm. diam., snow white, slightly convex; exuviae sublateral, brownish-orange, first skin wholly on second. ♂ scale unknown.

♀.—Circular, orange-brown, hind end strongly striate. Five groups of ventral glands, median 25 or more, nearly touching cephalolateral, cephalolateral about 15, caudolateral 7 to 12. Anal orifice small, caudad of caudolateral glands, but some distance from hind end. Only one pair of distinct lobes, these rounded, not particularly large, very slightly inclined to be crenate on edges, nearly touching at base; at outer base of each lobe a spine; then a spinelike plate, the branching tips of which slightly exceed the lobe; then a pair of minute tubercles representing the second lobe, then a spine; then a very large and stout spinelike plate, branched at tip; then three minute tubercles, then a spine; then a spine-like plate resembling the second but not quite so stout; then a slight notch, followed by a minute tubercle, then on the margin at intervals twelve ordinary spinelike plates of moderate size, and a few spines. At the bases of the median lobes are short dark sacs, a pair to each; and smaller sacs mark the places of the obsolete lobes on the margin. The oval and elongate glands in rows marking the obsolete segments are comparatively few in number.

Hab.—Crowded on fruit of "Chico Sapote," Laguna, Carmen I., Mexico, April 24, 1896. (Townsend: Div. Ent., No. 7184) Very near to *D. amygdali* (*lanatus*); it may be recognized by the small number of orifices in the caudolateral groups of glands, the form of the lobes, and other minor details.

(4.) *Comstockiella sabalis*, v. *mexicana*, v. nov.—♀ oval, orange-yellow. Grouped glands as follows: Caudolaterals 14-17 (6-10 in type); mediolaterals 11-15 (4-7 in type); cephalolaterals 7-10 (4 in type). Scale as in type.

Hab.—On palms which arrived at San Francisco from Mexico; found by Mr. Craw, who thinks the palms came from near Maratlan, and were growing wild about 75 or 100 miles inland. The genus is new to the Mexican fauna.

(5.) *Lecanium* (*Eulecanium*) *perditum*, n. sp.—♀. Long. 3, lat. 2 to $2\frac{1}{4}$, alt. $1\frac{1}{2}$ mm., general shape low-conical or hemispherical; very

dark brown, more or less shiny; sides with linear plications. Boiled in caustic soda turns the liquid yellowish-brown. Antennæ pale, well-developed, tapering, ordinary, 7-jointed, formula 32 (17) 5 (46); 3 extremely long, considerably longer than 4 to 7 together; 2 about as long as 4 + 5; a faint false joint marks the basal $\frac{1}{4}$ of 3; 1, 2 and 3 each with a pair of bristles, on 1 and 2 about the middle, on 3 near the end; 7 with several hairs, an especially long one, longer than itself, springing from its base. Rostral loop short. Anal plates yellowish-brown, the caudolateral margin somewhat shorter than the cephalolateral. Legs well-developed, pale. Digitules filiform, with large knobs. Tarsus hardly half length of tibia. Derm not reticulated, with sparse small round or oval gland orifices; a broad marginal area with very large round or oval gland-pits, the derm between them exhibiting a faint tendency to minute reticulation. These large gland-pits are double or more often complex; they are often nearer together than the diameter of one.

Embryonic larva (after boiling) pale yellowish-brown; rostral filaments in two coils. Caudal tubercles not or little projecting beyond body margin, though well-developed. Anal ring with six hairs, its broad margin conspicuously striate. Claw long; digitules of claw filiform, distinctly knobbed, extending beyond tip of claw; tarsal digitules stouter, with very distinct knobs, not nearly twice as long as claw-digitules, their origin some distance basad of base of claw.

Hab.—Xcolak, near Izamal, Yucatan, Mexico, March 10th, 1896. (Townsend: Div. Ent., No. 5663.) This is a most interesting species; the first *Eulecanium* ever found in the tropics. The antennæ are like those of *L. antennatum*, Signoret. The compound submarginal glands or pits remind one of the large double glands of *L. Fletcheri*. On the other hand, the large pits of the neotropical species *L. baccharidis* (from Brazil) and *L. batata* (from Antigua) are at once suggested, and it seems that we have here an indication of the affinities of these two species, which had been heretofore wholly obscure. *L. perditum* presents some superficial resemblance to small examples of *L. depressum* or *begonia*, but these belong to a quite different section.

(6.) *Lecanium chilaspidis*, n sp.—♀ very dark brown, shiny, but largely encrusted (especially at sides) with a dull dark grayish substance; strongly convex, long. $8\frac{1}{2}$, lat. 6, alt. 5 mm. Beneath, at the lateral (spiracular) incisions, are conspicuous patches of white secretion, only

visible after detaching the scale. Younger specimens are flatter, long, 6, lat. 4, alt. 2 mm. There is no waxy secretion on the surface.

♀.—Boiled in soda stains the liquid dark Vandyke-brown. No legs or antennæ found; probably they are rudimentary and easily deciduous. Anal plates small, pinkish-brown, together forming about a square. Derm pale reddish-brown after boiling, not reticulated, remarkable for an immense number of minute gland orifices, among which are interspersed a lesser number of larger, but still small, glands, which are circular and brown in colour. There are also large brownish patches. In places the tubular ducts of the minute glands are darkened, giving the derm a bristly appearance. The derm may be compared to the sky seen through a telescope, the minute glands being the fixed stars, the larger the planets, and the patches the nebulae, though of course the sky does not exhibit so many planets or nebulae.

Embryonic larva (after boiling) very pale pink, with very well-developed, stout, cylindrical caudal tubercles, which are the forerunners of the anal plates; each emits the usual long bristle, but these are easily broken off. Tarsus hardly or not over $\frac{2}{3}$ length of tibia, femur and tibia approximately of equal length. Digitules all filiform, the tarsal ones very long, twice as long as those of claw, and longer than the tarsus itself. Rostral loop extending considerably beyond the hindmost legs. Anal ring with apparently only six bristles. Last joint of antennæ long.

Hab.—On *Chilaspis linearis*, Tehuantepec City, Mexico, May 26th, 1896. (Townsend: Div. Ent., No. 7216.) On the *Chilaspis* at the same time and place were also taken species of *Aspidiotus* and *Mytilaspis*, but the material is inadequate for proper study. *L. chilaspidis* is a very distinct species, but more nearly allied to other neotropical forms than to anything else.

(7.) *Lecaniodiaspis (Prosopophora) radiatus*, n. sp.—♀. Long. 3, lat. 2 mm., often rounder, to long. $2\frac{2}{3}$, lat. $2\frac{1}{4}$ mm., more or less shiny, flattish, pale ochreous, with a longitudinal median keel, low but distinct, and well-defined radiating ribs, marking the segments. Removed from the bark, the scale leaves a whitish mark. Boiled in soda, it turns the liquid greenish. Antennæ pale brownish, apparently 8-jointed, but the joints obscure; 8 short, buttonlike; 3 longest, then 4, or these two about equal; 2 broader than long; 5 and 6 might be taken for one long joint, fully as long as 3; 7 very little smaller than 6. Dermis with numerous very small figure-of-8 glands, which under a low power look like

simple oval glands. Mouth-parts large, yellowish. Dermis not minutely wrinkled. Antennal formula (34) (12567) 8. 8 with some bristles, one longer than itself.

Hab.—On bark of branch of some woody plant, Salina Cruz, Mexico, May 29, 1896. (Townsend: Div. Ent., No. 7194.) *L. radiatus* is much more depressed than *quercus*, not marked like *dendrobii*, rounder than *acacia*, differently coloured from *eucalypti*, darker, rounder and smaller than *rufescens*, darker and more distinctly radiately ribbed than *yuccæ*. It seems to be very near to *Lecaniodiaspis atherospermæ* (Maskell), by its small size, 8-jointed antennæ, and very minute figure-of-8 orifices; yet it differs in some particulars, and is, I believe, not the same. *L. atherospermæ* is from Australia, but it may not be a native of that country. Mr. Maskell himself remarks that it is more like the neotropical *dendrobii* than the other Australian members of the genus.

(8.) *Conchaspis Newsteadi*, n. sp.—♀ scales crowded on the bark, overlapping; subcircular to oval, dirty white, low conical, diam. $2\frac{1}{2}$ mm. Apex sublateral, no radiating ridges.

♀ oval, orange-brown, similar to *C. angræci* in most respects. Antennæ 6-jointed, joints subequal, variable. Femur longer than tibio-tarsus, coxa about twice as broad as long. The round gland orifices with crenate edges (so strongly crenate as to appear moniliform) are very distinct; the hindmost segment that shows them is the fourth from the end, this has a pair, close together, on each side. The next segment has on each side four close together, one a little mesad of these, then two at considerable intervals mesad. The next has on each side five in an irregular row, and two pairs at considerable intervals mesad. The next has five and one mesad. The details of the arrangement will differ on the two sides of the same specimen. Long marginal hairs as usual in the genus. Lobes at end of body indistinct.

♂ scale similar to that of the ♀ in texture, but small and elongate.

♂ Pupa red-brown, antennæ stout, of about 7 joints, reaching beyond base of the large rounded wing-pads; end of abdomen with a short, stout caudal stylus, blunt at tip; on each side of the last abdominal segment, by the base of the stilus, are three bristles, two very small, one longer.

Hab.—On Zuchil tree (*Plumieria*), Vera Cruz, Mexico, Feb. 26th. (Townsend: Div. Ent., No. 7159.) I take the liberty of connecting with this insect the name of Mr. R. Newstead, who, under the name of

Pseudinglisia, has given us the best account of *Couchaspis* yet published. With Mr. Green's Ceylon *C. socialis*, this will make the third species of the genus so far discovered. The ♂ pupa, now described, is very interesting, as it is just like the pupa of a Diaspid.

(9.) *Llaveia axinus* (de la Llave).—Prof. Townsend found at Salina Cruz, on May 27th, specimens of a large monophlelid, which I believe is identical with the imperfectly described *Ll. axinus*. The specimens are red, with mealy powder, and are sparsely marked with small black spots; dried specimens appear more grayish, and look something like very large *Coccus cacti*. The legs and antennæ are red-brown, the inner side of tibia and tarsus presents a row of short spines, about 11 on anterior tibia, and six, very small, on anterior tarsus. There are two rows of longer spines on the under side of the femur. Dermis rather thickly beset with short hairs. The largest specimen sent to me is perhaps not adult, and has only nine-jointed antennæ. Its dimensions are, long. 13 mm, lat. $6\frac{1}{2}$, alt. $4\frac{1}{2}$ mm. It appears, however, that adults were certainly found by Townsend, as among the material received at Washington were both eggs and young larvæ. Dr. Howard has kindly lent me a mounted larva, from which I have made the following description:

Larva oval, bright red, beset with short, rather stout spines. Seven very long hairs on each side of hindmost half of body, one to each segment, each accompanied by a much shorter and more slender hair, the smaller hair on the penultimate segment longer than its representatives on those anterior to it, and about half as long as the long hair of the same segment. The long hairs of the caudal segment accompanied by two smaller hairs, of which the innermost are the longest. Legs long, femora moderately stout, those of front legs about as long as tibia, of hind legs shorter than tibia. Tibia and tarsus very slender; tarsus of front legs equal with tibia, of middle legs a little shorter, of hind legs conspicuously shorter than tibia. Claw long, little curved. Eyes very dark, subconical. Antennæ 6-jointed, last joint or club very large, much swollen, longer than 4 + 5, with three whorls of hairs. Second joint a little longer than third, 3 and 4 equal, 5 shortest. The joints from 1 to 4 might be called subequal, and the formula then written 6(2134)5.

I am inclined to suppose that *Llaveia* and *Ortonia* will prove to be the same genus, differing at any rate not more than do species now included under *Iserya*.

EARLY STAGES OF BREPHOS INFANS.

BY DWIGHT BRAINERD, MONTREAL.

Eggs laid April 25th, side by side, packed closely together on the twig at fork of leaf bud. The moth standing head downwards with half opened wings and "see-sawing" out a string of from three to twelve eggs. Between times it runs all over the twig as do the Tineids. Egg oblong, rounded at both ends, length .87 mm., width .46 mm. Slightly roughened and punctured like the skin of an orange. Colour at first a delicate pea-green turning yellowish. The number deposited at the base of each leaf varied considerably. Hatched May 3rd to 5th. At birth larva 1.6 mm., semi-transparent, light sap-green with evanescent purple shades. Body cylindrical, of same approximate size throughout, ending in a strongly bifurcate anal segment. Head light yellow-brown; 1st and 2nd epicranial and 1st clypeal setæ rudimentary, the remaining eleven primary setæ well-developed blunt bristles. Ocelli prominent, dark brown. Shield concolorous. True legs transparent, with dark claws; 4th prolegs fleshy, rimmed with brown: the others not showing.

Segments 3-winkled, tubercles uniform on the abdominal joints; a pair each side of dorsal line, a single one above, a pair below spiracles and one above leg plate. Caterpillar a semi-looper, suspending itself by a thread.

Second stage.—3.75 mm. Colour whitish-green, head yellow. Inter-segmental spaces white and much swollen.

Third stage.—Length 12 mm. Sap-green changing to apple-green. Head and appendages, except claws, transparent. Body marked with a double ad-dorsal and a stigmatal white line.

Fourth stage.—Length 30 mm. Colour on dorsum apple-green to blue-green, according to age. Head appendages and venter much lighter; almost yellowish. Tubercles simple, white, oval to round; setæ short and spinulate. Ad-dorsal line wavy, obscure, slightly broken. There is a narrow double white line through abdominal segments on lateral surface enclosing a darker area; and stigmatal band is broad, white to yellow-white. Spiracles red-brown edged with black, set in indistinct white blotches. Body cylindrical, tapering from 12th segment. Pupated June 12th. Food plant white birch. Pupa green at formation, changing to dark chestnut-brown. 14 x 4 mm., smooth. Extremities short, rounded; medial portion cylindrical, of equi-width; the whole cocoon approximately oval. Prothorax strongly incised dorsally and pitted. Frontal headpiece convex, hyaline. Maxillæ reach nearly and antennæ fully to extremity of wing-covers. (4th a. s.) Abdominal segments slightly indented down the back. Cremaster with a single stout hook.

Mr. H. H. Lyman kindly measured the eggs, and I had the advantage of Rev. Mr. Fyles's notes on the caterpillar.

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NOTES ON GRAPTA INTERROGATIONIS, FABR.

BY H. H. LYMAN AND A. F. WINN, MONTREAL.

This species was unusually abundant in this, as in many other localities, during the season of 1896, and afforded an excellent opportunity for studying it, which we took advantage of by rearing it from the egg. The preparatory stages are well known, and a full account of the life history was given by Mr. W. H. Edwards in CAN. ENT. XIV., pp. 201-207. As noted by Mr. Edwards, the larvæ vary greatly, and this is true even in those raised from the same batch of eggs, and these variations seem to be in no way connected with the two forms of the imago.

In Mr. Caulfield's List of Diurnal Lepidoptera of the Island of Montreal, published in the CAN. ENT. in 1875, this species is called "rare," and its seasons are stated to be "May (hibernated); July to October."

The question as to the number of broods in the season is an interesting one and requires careful examination, but the majority of the authorities are not very clear upon this subject.

Dr. J. G. Morris made no attempt in his "Synopsis" to deal with seasons or broods.

Dr. Harris is not very clear, as he says that the butterfly "first appears in May and again in August and September," and that "the caterpillars come to their full growth in the latter part of August." From these statements it would seem as if he only recognized one annual brood, the individuals of which hibernated and appeared again in the spring; but he says further that "there is probably an early brood of caterpillars in June or July," though he had not seen any on the hop vines before August, but from his remarks on the duration of the pupa stage, viz., "the chrysalis state usually lasts from eleven to fourteen days, but the later broods are more tardy in their transformations, the butterfly sometimes not appearing in less than 26 days after the change to the chrysalis," would seem to indicate that he recognized more than two broods.

Dr. Packard in his "Guide" says of the butterfly : "It is found in May, August, and Autumn," which would not indicate more than two broods.

Mr. W. H. Edwards, who bred this species repeatedly at Coalburgh, says in the CAN. ENT., X., 71, and XIV., 204, that in West Virginia "there are three broods and a more or less successful effort for a fourth." "In Florida," he says, "there are at least four broods, and probably five," but that "in the Northern States, and probably in Canada, it is two-brooded."

Prof. Fernald in "Butterflies of Maine" says nothing of the number of broods, but mentions the dimorphic forms, so he must have recognized that there were at least two broods.

Mr. Scudder in his "Butterflies of New England" says it is double-brooded, the first brood in descent from the hibernators appearing in July, sometimes during the last days of June, and continuing into August, the second brood beginning to emerge towards the end of August and continuing to do so until at least the middle of October.

In regard to the dates at which the hibernators appear in this latitude, Mr. Winn records in his notes April 25, 1890 ; April 14, 1892 ; April 9, 1894 ; and found it quite common in New Brunswick the first week in May in 1896, the specimens seen there being of the form *Fabricii*. A few *Fabricii* were seen around Montreal during the latter half of May, but no particular attention was paid to them ; but on the 6th June our Montreal Branch joined the Natural History Society in its annual field day, but separated from the party at Ste. Adele, at which point a number of *Interrogationis* were seen, and two were taken by one of our members, but both were of the form *Umbrosa*, though worn, and either hibernators or, perhaps, colonists from the South.

In this connection reference may be made to the experience of Mr. W. F. Fiske, of Mast Yard, N. H., as written to Mr. Lyman, and since then published in the CAN. ENT., XXIX., 26. In this case no specimens of *Interrogationis* were seen till the middle of May, when a badly worn *Umbrosa* was observed, and during the rest of the month this form was common, but no *Fabricii* were seen, and this certainly suggests the idea that these individuals were colonists from the South.

On 13th June our Branch had a little excursion to the Blue Bonnets Swamp, about half way to Lachine, and several *Umbrosa* were seen and

taken. Most of these were worn, but Mr. Winn saw a fresh specimen, and others were seen and one secured on the 14th.

These were evidently individuals of the first brood in descent from hibernators or colonists, and assuming that the eggs were laid during the first week of May, would allow about six weeks from egg to imago, which corresponds with the experience of Mr. Edwards with the first brood in West Virginia, which took 37 days—28th April to 4th June.

On 14th June Mr. Winn also observed two very much worn Fabricii ovipositing on the young leaves of an elm. This late laying of eggs causes the broods to overlap and makes it almost impossible to tell to what generation any captured specimen belongs.

From the 15th to the end of June Umbrosa was quite common, but no more Fabricii were seen. On 24th a number of larvæ, apparently not more than a day old and quite close to the empty egg-shells, were found, and on 25th about 40 eggs and seven young larvæ were found on a bunch of elm leaves plucked at random. These produced the imagos between 19th and 29th July and were 31 Umbrosa and two Fabricii, and were doubtless part of the second brood of the season.

On 1st July Mr. Lyman took at Lachine a ♀ Umbrosa and confined it over leaves of elm, but no eggs were laid for over a week.

On 12th July the butterfly was found to be dead, but had laid 101 eggs, some almost ready to hatch and some just recently laid.

The eggs began hatching that same evening and others continued to hatch during the 13th and 14th. Some of the earliest to hatch passed first moult on the 15th, the third day from the egg. The first chrysalis was formed on 5th Aug., and the first imago emerged on 13th Aug., giving a pupal period of eight days, a period from hatching of egg to imago of 32 days, and a probable period from oviposition to imago of 35, or, at the outside, 36 days.

Some, of course, took a few days longer than this, but all had emerged by the 21st August. Of nearly 60 butterflies which emerged, not more than five were Fabricii, all the others being Umbrosa.

Now it seems clear that the parent butterfly which was taken on 1st July, but would not lay till 8th or 9th, must have belonged to the first brood in descent from the hibernators or colonists, whichever the early ones were, and that the brood thus reared represented the second brood, and there would be abundance of time after the 21st August for a third brood to mature. That such a third brood must exist is practically

proved by the fact that the second brood as raised by us was almost entirely composed of the form *Umbrosa*, while it is well known that *Fabricii* largely predominates in the autumn, which would not be the case if there were no third brood.

On 26th July, while Mr. Winn's second brood was emerging, he confined a ♀ *Umbrosa* on elm and obtained eggs the same day, which hatched on 30th. Others were caged on 28th and five more on 2nd Aug., on hop, and many eggs were obtained. Some were left on the food plant, but the others were taken on a holiday trip to Metis, Q., the last hatching 7th Aug. On Aug. 24th the first chrysalis was formed, and imago emerged 4th Sept. and proved to be *Fabricii*, but at the same time a number of the larvæ were just past the third moult. While at Metis the larvæ were fed on hop, as elm trees were not found, and when brought back to Montreal were again fed on elm.

Either from this change of diet or from the colder climate of the lower St. Lawrence, the majority of this brood were greatly retarded and emerged at intervals all through September, and one as late as 18th Oct. Of nineteen individuals seventeen were *Fabricii* and two *Umbrosa*.

One fresh *Umbrosa* was also seen on 16th Sept., and *Fabricii* was common on the fine days of the early part of that month.

This makes the third brood, with a varying preparatory life duration of 40 to 77 days.

With Mr. Edwards the period of the third brood varied from 31 to probably over 50 days.

In nature the oviposition of the various broods would doubtless be extended over a longer time and the emergence of the imago similarly spread out, but when a species can go through all its changes in from 31 to 36 days it stands to reason that there must be at least three broods in the season in this latitude.

The third brood must certainly hibernate, and Mr. Winn found that those flying in September did not seem inclined to lay eggs, and careful search failed to produce a single one.

In CAN. ENT., X., p. 72, Mr. Edwards states his belief that the scarcity of hibernators in the spring compared with the abundance of the species in the summer is due to the existence of the species being dependent on the partial fourth brood, which he considers the only one that hibernates, and states that the species does not suffer from parasites to any extent.

This statement, published in April, 1878, is strikingly at variance with his former notes upon this species in part 9 of Butt. N. A., I., issued in January, 1872, pages 117-118 of the volume, where, after recounting the large number of enemies which prey upon it, he says, "It is doubtful if much more than two per cent. of the eggs laid produce butterflies."

Mr. Winn collected early in September from off the fence over which his hop vine grew 32 chrysalids, being the result of the eggs laid 3rd and 4th August, which he had left upon the vine. From these only two butterflies emerged, both on 18th September, and, curiously enough, one was a ♂ *Umbrosa* and the other a ♀ *Fabricii*. All the others were attacked by parasites, which Mr. W. H. Harrington determined as *Pteromalus puparum*, Linn.

The following notes upon the eggs were made by Mr. Lyman.

In regard to the colour, number of ribs, etc., of the eggs, there is considerable divergence among the authorities.

In regard to the colour, Scudder, quoting Riley, says that at first they are dull bluish-green, afterwards becoming grayish green with silvery reflection. Edwards and Fernald call them "pale green," and this I consider correct, as I could see no trace of blue green about them. Edwards says that the eggs have eight or nine vertical ribs, and is followed by Fernald. Edwards also says that the eggs laid in strings have always the same number of ribs, and hence Scudder deduces the theory that individual butterflies always lay eggs of the same number of ribs, but the latter author gives the number of ribs as "nine to eleven, commonly ten."

Of the 151 eggs laid by my butterfly in confinement, 24 were laid on the leaves, 3 being above and 21 below, and the rest, except 2, on the gauze.

There were ten strings of two, four strings of three, one pyramid formed of two below and one above, and another formed by one standing upright upon one on its side, and sixty-four singles. Some of the strings were very irregular, and some had apparently been laid at different times.

Of 52 eggs examined, 31 had 9 ribs and 21 had 10. One of 9 ribs, with larva nearly ready to hatch, had a green newly laid egg with 10 ribs on top of it.

In striking contrast to its abundance in 1896, only one specimen of this butterfly was seen during the season of 1897 by Mr. Winn.

NEW SPECIES OF CHIONASPIS.

BY R. A. COOLEY, B. S., AMHERST, MASS.

At the request of Prof. T. D. A. Cockerell, through correspondence with Prof. Fernald, I was induced to take up the study of the genus *Chionaspis*, and Prof. Lull the genus *Pulvinaria*. Prof. Fernald prepared and sent out a circular letter to all entomologists whose addresses could be obtained, in this and other countries, and personal letters were also sent to the leading coccidologists, asking for as many species as possible to aid in the preparation of monographs of these two genera. The result has been most gratifying, for already a very large amount of material has been received.

In the material before me the following new species of *Chionaspis* have been found, and are published now in preference to waiting till the monograph is issued. The studies on these insects are being made in Prof. Fernald's entomological laboratory connected with the Massachusetts Agricultural College, where every possible facility is afforded for breeding and studying insects, together with very complete literature of the subject.

Chionaspis Cockerelli, n. sp.

Scale of female.—The female scale is about 3.2 mm. long, straight or very slightly curved, moderately thick in texture, slightly convex, white, with the exuviae pale yellowish-brown, the second skin being covered with secretion.

Female.—The pygidium is distinctly notched at the end, the sides of the notch being formed by the divergent median lobes. These lobes are firmly united at the base and have serrate edges. Two distinct parallel spines arising from the bottom of the notch are about as long as the distance between the inner edges of the lobes at the base. Compared with the other lobes of the pygidium the median ones are larger and extend farther into the body. Each lobe of the second pair is composed of two well rounded and distinct lobules, the incision between them extending to the base of the lobe. The inner lobule is larger and extends posteriorly about even with the median lobes. The third pair of lobes may be present or aborted; when present they are broad and low, with an elongated pore anterior to the base of each. Between the median and second pair is a minute spine, followed by a plate which is about as long as the second pair of lobes, and following these is a conical projection bearing a marginal pore. Outside of the second lobe is a spine, a plate

and a marginal pore, this plate being a little larger than the first one. Following the third lobe, when it is present, or a space when it is absent, there are two spines, one above and one below. These are followed by a plate and a distinct marginal pore, and after an interval interrupted by one or two spines, another plate, and following this another interval, terminated by a group of about three plates.

The spinnerets are in five groups: median, 7-9; anterior laterals, 17-23; posterior laterals, 23-34.

Described from dead and shrunk specimens.

Scale of male.—Length, 1.2 mm.; feebly carinated, white, with the larval skin almost colourless.

Described from a single imperfect specimen.

Male—Male insect unknown.

The specimens were taken by Mr. Alexander Craw, on palm imported from China to San Francisco, Cal., July 11, 1897.

I take pleasure in naming this insect after Prof. T. D. A. Cockerell, who has made extensive and valuable contributions to our knowledge of the Coccidæ, and has shown me many kindnesses in my work on this group of insects.

Chionaspis aucubæ, n. sp.

Scale of female.—The female scale somewhat resembles that of *Chionaspis Lintneri* in outline, being strongly broadened posteriorly and abruptly rounded at the extremity. It is moderately convex, about 3 mm. in length and about 2 mm. in width. The exuvæ at the apex of the scale have the first skin very pale yellow, and the second yellowish or brownish. The second skin is covered with a slight secretion. The scale itself is white and very thick and strong. There is a partial ventral scale at the anterior end.

Female.—As I had only dead and dry specimens of this insect, I made no attempt to describe anything but the pygidium of the female. Median lobes moderate in size, divergent, united at the base, with their inner edges distinctly serrate. Each lobe of the second pair is composed of two rounded lobules, the incision between the two reaching nearly or quite to the base of the lobe. The inner lobule is larger and projects farther posteriorly than the outer, sometimes surpassing the median lobes. The third lobe is simple and sometimes rudimentary. Between the bases of the median lobes is a pair of minute convergent spines. On each side between the median and second lobes are a spine, a plate and a marginal

pore, and between the second and third lobes two spines, one above and one below, followed first by one or two plates, and then by a conical projection bearing a marginal pore. Outside of the third lobe are a spine and from one to three plates, then a slight notch, immediately followed by a marginal pore and after a space two unequal spines and about three plates. Following these plates are a notch and a marginal pore, then after a space a group of about five plates.

Spinnerets arranged in five groups: median, 8-14; anterior laterals, 19-28; posterior laterals, 19-33.

Scale of male.—The male scales are much more numerous than those of the female. They are white, delicate in texture, about 1.2 mm. in length, the larval skin at the anterior end being colourless or slightly yellowish. The scale itself may be parallel sided or slightly broadened posteriorly, and is indistinctly carinated.

Male.—Male insect unknown.

On *Aucuba* from Japan. Discovered by Mr. Craw in the course of his quarantine work at San Francisco. The scales are grouped together on one side of the leaf beneath, and the edge of the leaf is folded under, almost completely hiding them from view.

Chionaspis wistariæ, n. sp.

Scale of female.—The female scale is about 2 mm. in length, though some specimens are slightly longer, moderately broadened, dirty white in colour and delicate in texture, being a close imitation of the epidermis of the bark on which it rests. The scales usually occur in the longitudinal cracks of the bark, and are partially concealed under the epidermis. They are very often pressed out of the normal form. The exuviae are brownish, and the second skin is covered with secretion.

Female.—The following description of the female was made from dead and shriveled insects. The median pair of lobes is large and conspicuous, the second pair considerably smaller, and the third pair obsolete. The median lobes are darker in colour than any other part of the pygidium, firmly joined at the base, their inner edges parallel and nearly touching each other for about half their length, then diverging at about a right angle, with the exposed edges serrate. The second lobe is composed of two lobules, the inner one being the larger. Within the outer edge of each of the median lobes is a spine, and next to this a short blunt plate, followed by a marginal pore. Between the lobules of the second lobe is a spine, and outside of the second lobe are a plate and

two marginal pores, followed first by a spine and then by a plate, which is about as long as the median lobes, and often forked at the tip. Outside of this plate are two marginal pores, followed by a spine and one or two plates, then after another marginal pore a group of about four plates.

There are five groups of spinnerets : median, 8-15 ; anterior laterals, 19-31 ; posterior laterals, 13-23.

Scale of male.—The male scale, as in all other species of this genus, is elongated in form and white in colour. The sides are nearly parallel, and it is distinctly tri-carinated. Length, about 1 mm. The larval skin resembles the anterior or smaller one of the female scale.

Male.—Male insect unknown.

Discovered by Mr. Craw, July 8, 1897, at San Francisco, on the bark of Wistaria from Japan.

Chionaspis pinifoliae heterophylla, n var.

Scale of female.—The scale of the female is indistinguishable from that of *pinifoliae*, Fitch, having the same range of form and size, the colour of the scale and exuviae being the same. The scales vary in size from 2 mm. to 3.4 mm., the average length being about 2.5 mm. The scale is white, strongly convex, with the exuviae at the anterior extremity yellow, both skins being naked.

Female.—The description of the female is made from dead and shriveled specimens. At the anterior end of the body are two distinct, curved bristles, which may be the rudiments of the antennae ; these are found also in *pinifoliae*. The last segment terminates in a median notch, the sides of which are formed by the divergent median lobes. The lobes of the second pair are low and inconspicuous, and each one is composed of two lobules of about equal size. Two minute spines, one above and one below, arise from near each median lobe, though back from the edge of the segment. Contiguous to each median lobe is a simple plate, outside of which is a marginal pore. Between the lobules of the second lobe is a distinct spine, and outside of this lobe is a plate with a spine at its base, followed by a marginal pore. Outside of the rudimentary third lobe is a marginal pore, followed by a spine and a plate with a spine at its base. Then follows a pronounced marginal pore, a short interval, another space and a long interval, interrupted only by a spine, and terminated by the fourth and last plate.

There are five groups of spinnerets : median, 4-8 ; anterior laterals, 12-18 ; posterior laterals, 14-16. The chief characters by which *pinifoliae*

and the variety can be separated are the presence of the median notch in the variety and the larger size and more rounded form of the lobes in *pinifolia*.

Scale of male.—The male scale cannot be distinguished from that of *pinifolia*. It is slightly more than 1 mm. long and .4 mm. wide at the posterior end, where it attains its greatest width. The scale is white, with a moderately distinct median carina. The larval skin is like the first one of the female.

Male.—Male insect unknown.

On Cuban pine, *Pinus heterophylla*, from Florida. I am indebted to Prof. A. L. Quaintance for a bountiful supply of specimens, as well as to Prof. Cockerell, who first called my attention to this insect and sent me specimens.

The scales are found chiefly at the bases of the very long, slender leaves, and mostly on the inner surface. A few specimens occur also on the stems of the new growth. There were circular openings in a few of the female scales, from which parasites had emerged.

The following original description, which has never been published, was sent to me by Prof. Cockerell to be added to this paper :

Chionaspis latissima, Ckll.

C. latissima, Ckll., Calif. Fruit Grower, June 5, 1897, pp. 4-5. (Descriptive note ; no full description.)

"Female scale circular, 2 mm. diam., white, semitransparent, with the light ocreous exuviae to one side, first skin half overlapping second, second skin oval. Eggs shining, pale pink.

"♂ scale linear, white, with a very feeble median keel.

"♀ when boiled in caustic soda turns yellow, marbled and suffused with bright blue-green ; the mouth-parts remain a warm brown. Under pressure the ♀ becomes greatly elongated. Anal orifice level with the lower (caudad) edge of the cephalolateral glands. Five groups of ventral glands, median of 8, cephalolaterals of 18, caudolaterals of 20. Lateral dorsal rows of elongated pores. General characters of *chinensis*, *nyssæ*, etc. Differs from *chinensis* by the median lobes being not or barely brownish, and being decidedly produced, and the second and third lobes each represented by three distinct lobules. The lobes are much more produced than in *nyssæ*. The spinelike plates are large. The scale is very similar to *vitis*, Green, but is smaller than that or *varicosa*, Green.

"On under sides of leaves of *Distylium racemosum*, from Japan, found by Mr. Alex. Craw, April, 1897, in the course of his quarantine work at San Francisco."

PREPARATORY STAGES OF PYRUS TESSELLATA, SCUD.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .02 inch. Blunt conical, height about the same as the diameter; ridged with about 30 longitudinal striæ, with shallower cross striæ. Colour pale green. Duration of this period six days.

Young Larvæ.—Length, .08 inch; cylindrical; head somewhat cordate, two-thirds the width of the body; the anterior part of joint 2 about one-half the diameter of the head, the posterior part as wide as joint 3; each joint back of 2 with four low transverse folds besides the very narrow fold at each end of the joint. Colour pale greenish with a white sheen; piliferous spots concolorous; hairs erect, forked to about the middle, the forks curving back towards the body anteriorly and posteriorly. These are the hairs from the piliferous spots. Hairs on the body black, hairs on the head and joint 2 white and not furcate. Head jet black; joint 2 pale yellow-brown with a black transverse bar just back of the middle of the joint; dark along the sides; thoracic feet black. There are eight hairs in pairs on the dorsal bar of joint 2. Duration of this period two or three days.

After first Moulting.—Length, .15 inch. Shape not materially changed. Head and joint 2 jet black; hairs all white, shorter than before, more numerous, the end capitate instead of bifid; head and neck corrugated. Duration of this period six days.

After second Moulting.—Length, .40 inch. Marked as before; hairs still capitate, white; a dorsal and subdorsal line a little more plainly green; head and joint 2 profusely hairy, but the hairs are all short, surface corrugated. Previous to this moult the larvæ mostly lay coiled on the surface of the food plant, but now they straighten out under a thin silky covering. Duration of this period four days.

After third Moulting.—Length, .50 inch. Cylindrical, head about the same width as the body; black, covered with white hairs, each of which has about six short side spurs from about the middle up; joint 2 black, with the dorsal bar red-brown with a whitish margin; hairs on this joint of two kinds, short and long, the long about one-sixth the width of the body in length and very shallowly trifid at the end; body, each joint with five folds, the anterior twice the width of the others; two forms of hairs, one very short and the other long, each long one about the length of those on joint 2 and arising from a white conical base, trifid at the outer end; the short ones arising from a shorter cone and capitate at

took specimens of it at Massett it was known only, Dr. Fletcher says, by the type specimen at Washington. The insects are found crawling over barnacle-covered stones and boulders near low-water mark. Occasionally they occur congregated in a mass of several hundreds under a single stone, but for what purpose I have been unable to discover. It is most abundant in autumn.

From some experiments I made with several specimens in a dish of salt water in which was a half-submerged stone, I observed that they cannot swim under water, but merely crawl on the stones, their pubescence enabling them to surround themselves with minute bubbles of air. They could not be induced to enter the water from the top of the stone. If forced to leave the stone they would swim on the surface, but seemed incapable of diving. If touched while on the side of the stone under water, however, they feigned death, and had the power of sinking readily to the bottom. Some that were left all night swimming on the surface of the water were found dead in the morning, while others which had been submerged all night were still active.

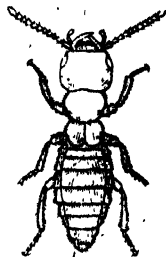


FIG. 35.

A question has been raised as to whether *L. cordicollis*, Lec. (exactly similar to the present species in form, but with the head and thorax brown), is anything more than a colour variety. I have watched both with this point in view, and speaking merely as a field observer, my belief is that they are separate species. *L. cordicollis* is the rarer of the two, but when it occurs it is in little colonies. I know, for instance, one large boulder where almost at any time I could take fifty specimens of *cordicollis*, but where I have never yet seen *brevipennis*. I have, moreover, never seen one of each *in coitu*, though pairs of one or the other are commonly met with. I may add that my view seems to receive slight confirmation from the fact that three other species of submarine beetles occur at Massett with black abdomen and limbs, but with brown head and thorax. On the other hand, however, I have noticed that the brown of *cordicollis* darkens considerably with keeping.

Tanyrhinus singularis, Mann. (Fig. 36.)

This curious insect seems to be rare in collections, for neither Mons. Fauvel nor the late Dr. Hamilton possessed a specimen till they received

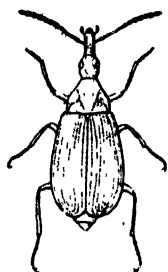


FIG. 36.

one from me. Mr. L. O. Howard, however, tells me he has a good series in the National Museum at Washington. It is by no means common at Massett, for I have only taken nine in seven years, and never more than three in one year. It has occurred always in the same spot—on the under side of a rotten spruce log on the ground. From positions I have taken it in I conclude that it feeds either on the rotten wood or on minute fungoid growths on the wood. On one occasion I obtained two specimens by pouring water into the log, which is now soft and fibrous with age, when they emerged from holes. The insect is slow and deliberate in its movements, and makes no attempt to fly when disturbed. It has occurred only in early spring; several of my specimens were taken in the middle of February when snow was on the ground.

ON THE GENERIC POSITION OF SOME BEES HITHERTO REFERRED TO PANURGUS AND CALLIOPSIS.

BY T. D. A. COCKERELL, MESILLA, N. MEX.

Having lately received from Mr. Friese, of Innsbruck, a number of European bees, I have been led to re-examine certain of our species, in order to determine their relationship to a number of old-world genera not supposed to occur in America. The result is extremely interesting, and seems to show that we have for many years been placing bees in genera to which they by no means belong. The following table may be used provisionally to separate the genera under discussion*:

A. Tongue more or less short and broad, tapering at the end. (*Andreninæ*).

1. Basal nervure nearly or quite straight.
 - a. Three submarginal cells..... *Andrena*, Fabr.
 - b. Two submarginal cells..... *Parandrena*, Rob.
2. Basal nervure strongly bent.
 - a. Three submarginal cells..... *Halictus*, Latr.
 - b. Two submarginal cells..... *Hemihalictus*, Ckll.

*Mr. Friese sends me also four examples of *Nomioides pulchellus*, Schenck, taken at Pest on the second of June. This bee is a *Perdita* with the venation of an *Halictus*! It is curious to see all the ornaments, sculpture, etc., of *Perdita*, with a long tapering marginal cell and three submarginals. It is evident from this, and from the absence of *Perdita* in the American tropics, that our genus is of boreal origin, not austral, as I formerly thought.

B. Tongue narrow and more or less elongated, usually quite long.
(*Panurginae*).

1. Marginal cell produced, tapering to a point, not appendiculate.
 - a. Body *Colletes*-shaped, abdomen with hair-bands. *Rhophites*, Spin.
 - b. Body *Halictus*-shaped, abdomen without well-formed hair-bands..... *Halictoides*, Nyl.
2. Marginal cell truncate at tip, usually appendiculate.
 - a. Body *Colletes*-shaped, abdomen usually with hair-bands..... *Calliopsis*, Sm.
 - b. Body *Halictus*-shaped, abdomen without well-formed hair-bands..... *Panurginus*, Nyl.

The genera under B have but two submarginal cells; those under A all have a marginal tapering to a point. I give the subfamilies as I find them, but it seems at least probable that the form of the tongue is an adaptive character, not to be relied upon for separating groups higher than genera. The *Panurginae*, notwithstanding the tongue, appear to be certainly *Andrenidæ*.

Parandrena.

The type is *P. andrenoides*, a spring-flying species. The smaller stigma of the autumnal "*Panurgus*" *pectidis*, *rhodoeratus* and *oliviae* is paralleled in *Andrena* by that of *A. pulchella*, also an autumnal insect. For the present I would place the three species of "*Panurgus*" named in *Parandrena*, with the reservation that they may hereafter need to be separated from it. They are much nearer to *Rhophites* than to *Panurgus*.

Hemihalictus.

The type is *H. lustrans*, described as *Panurgus*. This looks not unlike the European *Halictoides*, but differs in the tongue, which in *Halictoides* is very narrow, and by the strongly bent basal nerve and the third discoidal cell considerably narrowed above.

Rhophites.

Mr. Friese sends me *R. quinquespinosus*, Spin., and *R. canus*, Ev. These are what we should call *Panurgus*, and if there are in our fauna any "*Panurgus*" with the pointed marginal cell, of fairly robust shape, with abdominal hair-bands, these will belong to *Rhophites*, provided they have the narrow elongated tongue which separates them from *Parandrena*. The stigma of *Rhophites* is small, as in the autumnal species provisionally referred above to *Parandrena*.

Halictoides.

Many authors have confused this with *Rophites*, but it is fairly distinct. I have before me the following species :

H. paradoxus, Moraw.—Innsbruck, July 15th; Sept. 13th, at *Euphrasia*. Coll. Friese.

H. dentiventris, Nyl.—Andermatt, July 9th; "Weissnfls," Aug. 3rd; Sept. 2nd, at *Campanula*, Coll. Friese.

H. inermis, Nyl.—"Weissnfls," July 13th, at *Campanula*. Coll. Friese.

H. marginatus (Cress., as *Panurgus*).—My New Mexico insect has stood as *halictulus*, Cr., but according to Robertson that is identical with *marginatus*. It flies in August and September.

H. campanula, n. sp.—♂. Length, 9 to 10 mm. Black, shiny; pubescence sparse; pale cinereous, mixed with black, on head and thorax; black, with a little cinereous, on abdomen and legs. Hair on inner side of tarsi shining orange-fulvous. Head large, very broad, a little broader than thorax, subquadrate, facial quadrangle very much broader than long, anterior edge of clypeus with a hoary fringe, clypeus and front appearing rough from very close punctures, mandibles with a well-formed inner tooth, antennæ crenulate, flagellum feebly tinged with ferruginous beneath; mesothorax shiny, with distinct, rather close punctures; enclosure of metathorax coarsely rugose; tegulæ piceous, with a hyaline band; wings smoky, nervures and stigma piceous, first recurrent nervure joining second submarginal cell considerably nearer its base than the second recurrent to its apex; second to fourth joints of hind tarsi broadened, triangular; abdomen shining, the surface appearing silky, hardly punctured; no hair- or colour-bands; sides of segments towards apex with tufts of black hair; apex conspicuously tufted with more or less shining sooty hair; a large tuft of sooty or black hair also arises from the sixth ventral segment, and is very conspicuous when the insect is viewed from the side. Tongue narrow.

Hab.—Four from Olympia, Washington State, June 30; all at flowers of *Campanula scouleri*. (T. Kincaid, coll.)

How many more of our so-called *Panurgus* will be found to belong to *Halictoides* I do not know, but it is probable that an examination of the types will show that we have at least as many *Halictoides* (six) as are known from the other side of the world.

Panurgus.

Taschenberg ("Die Gattungen der Bienen") separates *Panurgus* from *Rhophites* by its *truncate, appendiculate, marginal cell*. Three European species, now before me, all exhibit this character, which is generic. It therefore follows that none of the so-called *Panurgus* of Cresson's 1887 Catalogue belong to that genus. So far as known, we have no typical *Panurgus* in North America; two *Panurgus*-like forms may be referred to a new group, thus:

Pseudopanurgus, n. g.

Type *Ps. æthiops* (Cr., as *Panurgus*). Includes also *Ps. fraterculus* (Ckll., as *Calliopsis*). Black, nearly naked, strongly punctured, wings fuliginous, marginal cell distinctly but obliquely truncate at tip, two sub-marginals, *first recurrent nervure joining second submarginal cell no great distance before its middle, second recurrent joining it just before its tip, basal process of labrum large, subquadrate*. In some respects this seems to resemble Provancher's *Chelynia* (which I have not seen), but it is surely not the same thing.

Panurginus.

Mr. Friese sends me *P. montanus*, Gir., collected at Airolo, Andermatt, and Innsbruck. It flies at the end of June and beginning of July; one specimen is marked as from *Ranunculus*. The clypeus is yellow in the ♂, dark in ♀. To this genus belong *Panurginus clypeatus* (Cr.), *bidentis* (Ckll.), *margaritensis* (Fox), *compositarum* (Rob.), *albitarsis* (Cr.), *ornatipes* (Cr.), *rudbeckiæ* (Rob.), etc., all now referred in our lists to *Calliopsis*. The European *P. montanus* has the venation of our *P. clypeatus*.

Calliopsis.

This name can be retained for such species as *C. andreniformis*, *coloradensis*, *obscurus*, etc. There also remain some forms which must be left in *Calliopsis* until a better place is found for them, although they seem scarcely congeneric with *andreniformis*.

DR. HARRISON G. DYAR has removed from New York to Washington, D. C., where he has accepted the position of Honorary Curator of Lepidoptera in the United States National Museum.

MR ARTHUR J. SNYDER, of Evanston, Ill., has recently been appointed Principal of the North Belvidere Schools. His address is now 521 East Madison street, Belvidere, Ill.

A LIST OF MANITOBA MOTHS.

BY A. W. HANHAM, WINNIPEG, MAN.

The following list of Manitoba species, it is hoped, will prove of interest to readers of the CANADIAN ENTOMOLOGIST :

With a few exceptions, the records are from my own observations and captures. The list covers the work or collecting of three whole seasons and the latter half of a fourth ; and it is to a great extent a local one, very little collecting having been done outside of the Winnipeg district.

Last season (1896), in July, and again this year, in August, I was fortunate in being able to visit Brandon, Man.—some 130 miles west of Winnipeg—where, especially during my first visit in July, I enjoyed some very successful collecting, and I am thus enabled to add a considerable number of things to my list, many of them very desirable species.

I believe a comparison of collections made at Brandon and at Winnipeg would show some striking differences, many of the Western forms occurring at Brandon not reaching so far east as Winnipeg. This district embraces some open "rolling" prairie, a good deal of swampy land covered with willow and other bushes, plenty of thick "bush" containing no trees of any size, a little fine timber, mostly elm, along the river "bottoms," and a gravel ridge many miles in extent, more or less wooded, with some sandy tracts, commencing at Bird's Hill, some eight miles from this city.

The last described locality much resembles the general run of country around Brandon, and after Elm Park, situated in a bend of the Red River, about three miles out of Winnipeg, is much the richest collecting ground within the district. The Province of Manitoba contains numerous lakes, some of vast area, as Lakes Winnipeg and Manitoba ; none, however, come within this district, nor have any yet been visited.

The list of Sphingidæ is but a meagre one, and I think hardly representative of the district ; certainly not of Manitoba as a whole. Nearly fifty per cent. of the Bombycidæ recorded were added this year, and they were, without exception, taken "at light," at the end of June and during July. But for this my list in these too would have been equally poor.

Mr. E. F. Heath, who lives near Cartwright, in Southern Manitoba—a much better country than this, I believe, for the entomologist—could, I feel sure, supplement these records.

Most of the Bombycidae have been submitted to Dr. H. G. Dyar, to whom I am under special obligations for his generosity in returning nearly everything sent to him (a large proportion being “uniques”). The Sesiidae were very kindly determined for me by Mr. Beutenmüller, through Dr. Dyar. I have also received welcome assistance from both Dr. James Fletcher and the Rev. C. J. S. Bethune.

Hemaris thysbe, *Fabr.*, var. *ruficaudis*, *Kirby*.—In 1894 (June 17th) several were seen hovering over the blossoms of the Wild Pea, but only one was secured. Later a number were noticed (dead) in the windows of some empty shops.

Met with again this season.

Hemaris tenuis, *Grt.*—On April 19th (1897) a pupa was found in the soil under a log along the railway line at Brandon. The moth evolved on May 18th.

Deilephila gallii, *Rott.*, var. *chamænerii*, *Harr.*—In the collection of Mr. H. W. O. Boger, of Brandon.

Deilephila lineata, *Fabr.*—Mr. Boger reported this moth as being very abundant, on the wing, on August 25th (1896), in a market garden at Brandon, in the evening, as many as 20 or 30 being visible at the same time. It occurred here about the same date. On August 5th (1894), quite early in the afternoon, and in the bright sunshine, I noticed a *Deilephila* on the wing over some thistles on the prairie, but I failed to net it.

Sphinx drupiferarum, *S. & A.*—At Brandon (1897), by Mr. Boger.

Sphinx luscitiosa, *Cram.*—On July 1st (1895) I found a ♀ at rest under the loose bark of a fence post, and on June 11th (1896) a fresh ♂ was found “sitting” on a sidewalk in the heart of the city.

Sphinx chersis, *Hbn.*—July, one in a shop window, also at Brandon, in Mr. Boger's collection.

Sphinx albescens, *Tepper.*—July 1st, one at light; another taken at Rounthwaite, Man., by Mr. L. E. Marmont.

Ceratomia undulosa, *Walk.*—July 8th, one at light.

Smerinthus geminatus, *Say*.—Common at light, June 27th to July 10th. Only previous records, one at rest on a tree in Elm Park, June (1894), and July 2nd (1896) one in a spider's web on a fence near the same locality. It had, without doubt, furnished a sumptuous repast, or several.

Paonias excæcatus, *S. & A.*—At light, June 27th and July 1st. Four specimens.

Paonias myops, *S. & A.*—An example in Mr. Boger's collection was taken at Prince Albert, N.-W.T. This species is likely to occur in Manitoba.

Cressonia juglandis, *S. & A.*—One at light, July 1st.

Albuna pyramidalis, *Barnst.*—One, July 8th (1896), Bird's Hill.

Sesia rubrofascia, *Hy. Edw.*—One, June 17th (1894).

Sesia albicornis, *Hy. Edw.*—Several, June 15th and 24th and July 13th.

Sesia sp.—July 26th, Brandon. One specimen spoilt in net, too rubbed to be determined.

All these Sesiidæ were taken when sweeping low herbage and flowers for Coleoptera, chiefly along railway tracks.

Alypia Langtonii, *Coupl.*—Several at Rounthwaite, by Mr. Marmont.

Scepsis fulvicollis, *Hbn.*—One at light, middle of July.

Sarrothripa Lintneriana, *Speyer*.—My first records, Sept. 1st and 13th, etc., show it to be a late species; but as I took it this year in July, at light, it may prove to be double-brooded. One of those captured is a very handsome variety.

Argyrophyes cilicoides, *Grt.*—According to Dr. Dyar, this is a rare species; it occurred at light from July 2nd to 20th.

Clemensia albata, *Pack.*—July 27th, etc., several at rest on trees in Elm Park, and one in the city.

Crambidia pallida, *Pack.*—A pupa found under a stone at Bird's Hill on July 21st (1895) produced the imago on Aug. 6th. Common this season at light, middle of July.

Crambidia casta, *Sanb.* (No. 988, Smith's List)—A pair evolved on Aug. 4th (1896). The larvæ were common under stones at Bird's Hill

on July 7th and 8th, and a number were boxed. A day or two later during or after a journey to Brandon, most of them escaped from my jar, These larvæ were small "woolly-bears," hairs dark brown. I think they were full-grown. Dr. Dyar states that the larva of this moth has never been described, so I regret not having made some notes on its appearance. A pair, having twice the expanse and somewhat lighter secondaries, were captured on the wing at dusk, on an open hillside at Brandon, on Aug. 27th this year.

Hypoprepia fucosa, *Hbn.* (*miniata*, *Kirby*)—One at light on July 10th (1896) at Brandon.

Euphanessa mendica, *Walk.*—July 3rd, etc., common in Elm Park.

Crocota ferruginosa, *Walk.*—One at Brandon, July 15th (1896).

Crocota immaculata, *Reak.*—Several July 15th, 21st, etc., at Bird's Hill, and on the prairies flying during the day. Very common this season during July at light. Pupæ found under boards, etc., on June 20th and July 1st.

Crocota quinaria, *Grt.*—Several in Elm Park and dark woods, July 3rd, etc., flying during the day; this species did not come to light.

Callimorpha clymene, *Brown.*

" *Lecontei*, *Bdv.*

" " *var. militaris*, *Harr.*

" *vestalis*, *Pack.*—One specimen only—a beauty.

All these *Callimorpha* were taken in Elm Park on July 1st and 3rd (1896).

Platarctia hyperborea, *Curt.* (*parthenos*, *Harr.*)—A specimen of this beautiful moth was captured this season at Brandon by Mr. Boger.

Arctia virgo, *Linn.*—Common this season at light, July 3rd to middle of month. Previous records: July 15th (1895) an imago hiding at the roots of weeds in my garden; a pupa found on July 1st, produced moth on 13th of month; a larva taken under a log on April 22nd (1894), produced the imago on July 3rd.

Arctia Saundersii, *Grt.*—Common at light, middle to end of July. One under a stone in gravel pit at Brandon on July 31st (1896).

Arctia virguncula, *Kirby.*—One at Rounthwaite, in Mr. Marmont's collection.

An Arctian in poor condition taken this year at Brandon, by Mr. Boger, may be *phalerata*, *Harr.*

Pyrrharctia isabella, S. & A.—Larvæ seen in 1894 ; moth not taken here.

Spilosoma virginica, *Fabr.*—This moth appears to be rare here ; it did not come to light. A moth was taken July 26th (1895), and some larvæ were seen on Aug. 25th, and several pupæ were found this spring at Brandon.

Spilosoma prima, *Slosson.*—A moth evolved on May 9th (1897) from pupa found at Brandon in April.

Spilosoma antigone, *Strk.*—Several, Aug. 25th, etc.

Hyphantria cunea, *Dru.*—Several, June (1894).

Euchætes collaris, *Fitch.*—One at Brandon this season by Mr. Boger.

Halisidota maculata, *Harr.*—One, at light, July 1st. (This specimen differs considerably from my Hamilton, Ontario, examples.)

Orgyia antiqua, *Linn.*—One, Aug. 15th (1895), at rest on a window in the city.

Orgyia leucostigma, S. & A.—Common at light, middle to end of July, and examples taken (also at light) on Sept. 24th and 28th.

Parorgyia Clintonii, G. & R.—On July 23rd (1895) I found two cocoons of this species in the folds of an old newspaper in some open woods. A moth evolved from one about Aug. 1st. The other produced several handsome ichneumons.

Parorgyia plagiata, *Walk.*—Common at light, middle to end of July.

Tortricidia testacea, *Pack.*—Pairs by beating, June 10th and 14th (1894). Specimens taken at light, end of June and beginning of July, this year were all poor.

Ichthyura vau, *Fitch.*—Several, at light, middle to end of July.

Ichthyura albosigma, *Fitch.*—Common at light from July 9th to end of month.

Ichthyura Brucei, *Hy. Edw.*—One or two, at light, about 20th of July.

Datana ministra, *Dru.*—One, at light, July 2nd.

Nadata gibbosa, S. & A.—Several, at light, June 27th to July 6th.

Gluphisia trilineata, *Pack.*—Common at light during July.

Notodonta elegans, *Strk.* (No. 1273, Smith's List)—Four specimens at light, June 27th to July 2nd.

Lophodonta angulosa, S. & A.—A pair at light, beginning of July.

Macrurocampa Dorothea, Dyar.—One at light, beginning of July. This species was described and figured on page 176 of Vol. XXVIII. of the CANADIAN ENTOMOLOGIST. Dr. Dyar states that my capture is only the second known specimen of this new species, and that it differs from the type in being darker and more heavily marked with yellow.

Pheosia dimidiata, H.-S. (*rimosa*, Pack.)—A pair at light, one on June 27th, the other on July 26th.

Edema albifrons, S. & A.—Several, at light, at the end of June.

Seirodonta bilineata, Pack.—July 8th (1894), one on a fence in the city.

Dasylophia anguina, S. & A.—One or two at light early in July.

Schizura ipomewæ, Doub.

“ var. *cinereofrons*, Pack.

Both these forms sparingly at light, July 2nd to 25th. But one specimen (*cinereofrons*) taken before in the district. July 14th (1895), at rest on a fence.

Schizura eximia, Grt. (No. 1300, Smith's List)—Several, at light, early in July.

Schizura badia, Pack. (No. 1302, Smith's List)—Taken at light from the end of June until nearly the end of July, but not common.

Schizura unicornis, S. & A.—Three at light early in July.

Ianassa lignicolor, Walk.—July 19th, three at light.

Cerura occidentalis, Lint.—New to me this season; took one at rest on side of house the first week in June; examples came to light on June 27th, July 15th, 18th and 19th.

Cerura cinerea, Walk.—One at light, middle of July.

Dryopteris rosea, Walk.—Common at light from July 3rd to end of month. On June 23rd (1894) one taken in Elm Park, at rest on a leaf. Not seen again until this season.

Dryopteris irrorata, Pack.—Two, at light, July 6th and 8th.

Attacus cecropia, Linn.—A specimen has been bred from the larva by Mr. Criddle, near Douglas, Man

Attacus columbia, Smith.—Recorded by Mr. E. F. Heath from Cartwright, and Mr. Marmont from Rounthwaite. Dr. Fletcher says that the food plant in the Northwest is *Elceagnus argentea*.

Actias Luna, *Linn.*—The Rev. W. Burman, of this city, reports the capture of a specimen in Elm Park, and last season in the same place I picked up a cocoon, most likely belonging to this species; it contained the decayed remains of the larva.

Telea polyphemus, *Cram.*—Winnipeg and Brandon, at light in June.

Anisota virginienensis, *Dru.*—Recorded from Miami, Man., by Dr. Fletcher. The larvæ causing damage to oak trees.

Clisiocampa fragilis, *Stretch.*—July 10th (1896) and later at Brandon; several at light and on fences. Also this season at Winnipeg, at light, in July.

Clisiocampa americana, *Harr.*—A moth evolved on July 15th (1896) from full-grown larvæ taken on June 20th. Several at light this season in July.

Clisiocampa disstria, *Hbn.*—One, at light, towards end of July.

Phyllodesma americana, *Harr.* (No. 1414 Smith's List)—One, at light, on July 1st.

Hepialus argenteomaculatus, *Harr.*—This moth appeared to be abundant here in 1895. I took specimens on the wing in my garden about dusk on July 11th, 15th and 17th; they were all hovering (a most peculiar flight they have) over some high weeds. Specimens were taken at rest on July 13th and June 30th (1896). On the first mentioned occasion the moth was holding on to a tall stalk of grass within a yard or so of a railway track.

This is a very variable insect, no two of those captured agreeing in colour or markings. Mr. Marmont has one, taken at Rounthwaite, which is nearly white. The records of captures at light, where the year is not given, are all for 1897.

(To be continued.)

The readers of this magazine will deeply sympathize with PROFESSOR H. F. WICKHAM, of the State University of Iowa, who has found himself compelled, in consequence of serious trouble with his eyes, to give up the study of Entomology. He is now disposing of his splendid collection of North American Coleoptera. This is a rare opportunity for Entomologists to complete their representatives of various families of beetles. That his eyes may ere long be restored to their normal condition is the earnest wish of all his friends.

BOOK NOTICES.

THE BOOK OF BRITISH BUTTERFLIES.—A practical manual for Collectors and Naturalists: 1 vol., pp. 247. (3s. 6d.)

THE BOOK OF BRITISH HAWK-MOTHS.—A popular and practical Handbook for Lepidopterists: 1 vol., pp. 157. (3s. 6d.) By W. J. Lucas, B. A. London: L. Upcott Gill, 170 Strand, W. C.

Many excellent works on British Butterflies have been published during the last twenty-five years, and one would naturally suppose that there was little need of another book on the subject. Mr. Lucas, however, has succeeded in producing a very useful and excellent popular manual, which will be a welcome aid to those who wish to study the life-history of butterflies as well as to identify the specimens they may collect in the British Isles. As it is intended for those who have made no previous study of the subject, the author begins at the beginning, telling the reader what an insect is, what place the butterfly takes in nature, how to capture, set and care for specimens, and then describes each British species from the egg to the imago in clear and simple language, and in almost every instance gives admirable drawings of the caterpillar, chrysalis, and both surfaces of the imago. As there are no less than 266 figures in illustration of sixty-eight species, the collector should have no difficulty in determining any specimen of butterfly in any of its stages (except the egg) that he may chance to find. A book such as this should give a great impetus to the study of the preparatory stages of British butterflies, a section of entomology which is usually neglected in favour of the mere collection and arrangement of the perfect insects. A volume such as this on Canadian butterflies would be a very welcome aid to a large number of young people whose interest has been aroused by the beauty and variety of our species, but whose enthusiasm is soon dampened by the difficulty of obtaining any information about them.

"The Book of British Hawk-Moths," by the same author, deals with a somewhat less familiar group, and gives much useful information that it would otherwise be hard to find. The plan of the work is similar to that of the Butterfly book, and it is written in the same clear and simple style. As there are only seventeen species to deal with, the writer is able to go more fully into details respecting them, and to make his work all the more complete and popular. He has also provided artificial keys to the larvæ and imagines, and tables for distinguishing the species where there is

more than one representative of the genus. The fifteen plates with which the volume is illustrated are very beautiful, and are admirably drawn by the author himself. Each species is represented life-size, and is shown as a caterpillar on its food-plant, chrysalis, and imago. There are also eighteen wood-cuts, for the most part illustrating details of structure. It is to be hoped that the author will continue his good work until he has completed the British Lepidoptera, or at any rate the more conspicuous and familiar families.

LIFE HISTORIES OF AMERICAN INSECTS.—By Clarence M. Weed: 1 vol., pp. 272. (\$1.50.) New York: The Macmillan Company.

The publication of a popular book on insects is so rare an event on this side of the Atlantic that we heartily welcome an addition to the number, especially when it is so excellent and satisfactory as the volume before us. Dr. Weed has selected some five and twenty more or less familiar insects, and in a pleasant manner has given some account of their life histories. The chapters are quite independent of each other and arranged in no particular order; the book may therefore be opened at random, and the sketch that may be hit upon read without any detriment to the continuity of the work. Some of them which deal with such creatures as the leaf-miners are naturally very brief, since so little is known about these tiny foes to vegetation, but of other species which have been subjects of particular study on the part of the author we find long and full descriptions. Among the latter may be mentioned the interesting account of the hibernation of aphides, the chapters on "harvest spiders," the "army-worm," etc. Any one, young or old, who has any desire to read about the wonderful creatures that inhabit the world, and to know something about their modes of life, cannot fail to be pleased with this book, and to be led on, we should hope, to make his own observations of their curious habits and strange doings. The volume is handsomely illustrated with 21 full-page plates and nearly 100 figures in the text.

INSECTS AND SPIDERS: their Structure, Life Histories and Habits.—By J. W. Tutt: 1 vol., pp. 116. (1 shilling.) London: George Gill & Sons, Warwick Lane, E. C.

In the Annual Report of the Entomological Society of Ontario for 1896 much attention was paid to the subject of teaching natural history, and especially entomology, in schools, and the desire was expressed that

some handbook might be drawn up for the assistance of teachers in rural schools. The volume before us is the very book that is needed, if only it dealt with Canadian instead of British insects. In England "Object Lessons" are a compulsory part of the curriculum in elementary schools, and the teachers are required to give their pupils a series of simple lessons "adapted to cultivate habits of exact observation, statement, and reasoning." These lessons are to be "on objects and on the phenomena of nature and of common life," and a wide discretion is thus left in the hands of the teacher. In the country schools of Ontario no subject could be more useful than the study in this way of the commonest species of injurious and beneficial insects, and no subject is likely to compare with it in interesting the pupils. A further advantage is the ease with which specimens can be obtained and their life histories traced. Mr. Tutt's volume is admirably adapted for the use of teachers in providing lessons of this kind. After giving a general account of the external structure of insects, their internal organs and metamorphoses, he devotes the "Lessons" to typical common species of each order, giving similar particulars regarding the individuals and any general facts of interest that bear upon them. Each insect treated of is also illustrated with plates and wood-cuts. It is not, however, a text-book for pupils, but is meant for the instruction and equipment of the teachers, affording them an excellent foundation upon which to frame the instructions they are to give to those committed to their charge.

VANESSA MILBERTI.

In "The Butterflies of the Eastern Provinces of Canada," by Rev. C. J. S. Bethune (Ent. Soc. of Ont. Report, 1894), it is stated that individuals of this butterfly were seen as late as the 18th Oct. I saw two specimens on the 25th Oct., flying actively across a street near the Hotel Dieu, Montreal. This usually common butterfly is scarce within the range of my entomological field work, which is principally confined to the north-east slope of Mount Royal, and the streets of Montreal around that neighbourhood. Only one other specimen was seen by me this season, and that was also at a late date, the 19th Oct. My collection specimen was caught in 1894, and since then, I have not seen another in the same district until the above appeared.

This butterfly was common around St. Andrews East, Que., from the 1st to the 4th Aug., 1896.

CHARLES STEVENSON, Montréal.

[A specimen was seen on the wing at Port Hope on the 5th of November last.—ED. C. E.]

Mailed December 6th, 1897.

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ERRATA.

Page 100, 5th line from bottom, for
"oratus" read "ovatus."

Page 168, 12th line from bottom, prefix
"7."

Page 168, 6th line from bottom, add
"Stylurus"

Page 208, 12th line from bottom, for
"tæta" read "læta."

Page 254, 27th line from top, insert a
comma after "stripe."

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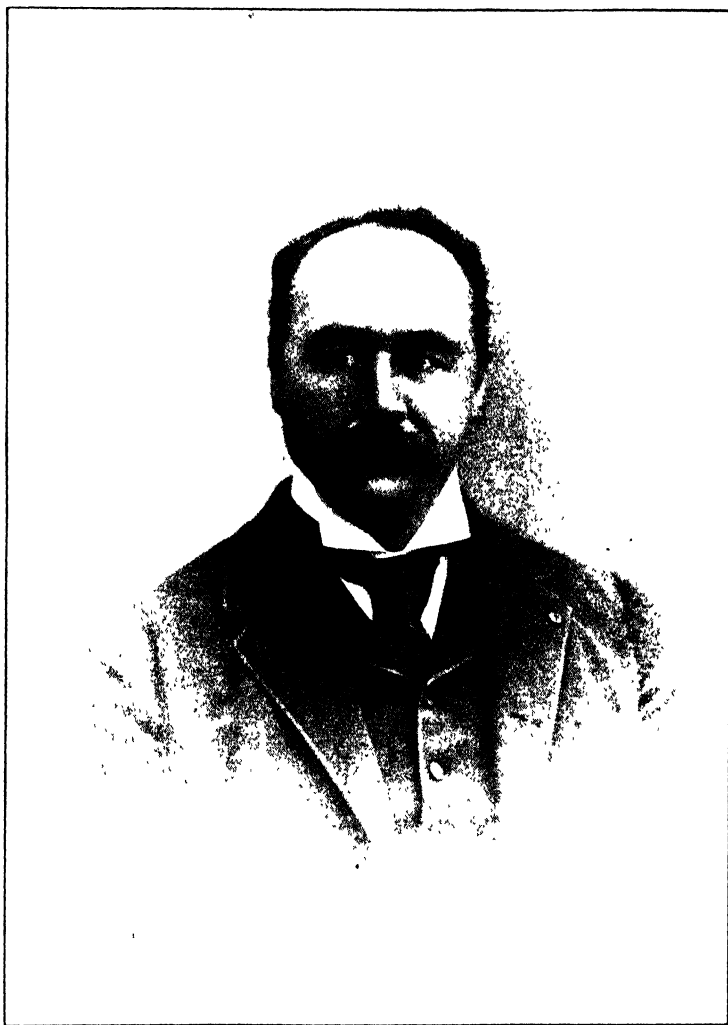
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PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1886-88.

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No. 1.

JAMES FLETCHER, LL. D., F. R. S. C., F. L. S.

We are happy to be able to begin the thirtieth volume of the CANADIAN ENTOMOLOGIST by presenting to our readers an excellent portrait of DR. JAMES FLETCHER, whose name is a household word among entomologists, not only in Canada, but throughout North America, and in many parts of the world besides. Born and educated in England, Dr. Fletcher came to this country, when a young man, as a junior officer in the Bank of British North America, and soon began to devote his leisure hours to the study of insects and plants. Finding the work of a bank by no means congenial to his literary and scientific tastes, he obtained a position as assistant in the Library of Parliament at Ottawa. It was not long before his talents and attainments in botany and entomology became widely known, chiefly through his contributions to this magazine and the annual reports of our Society. His first paper in the latter was an article on Canadian Buprestidae, which was published in 1878, while his first contribution to this magazine appeared in January, 1880. During all the years that have followed no volume of either publication has been issued without some valuable articles from his pen.

In 1878 he became a member of the Council of the Entomological Society of Ontario, and every year since has been elected to hold some office in the Society, being four times vice-president, and for three years, 1886-8, president. In 1879 he was one of the originators of the Ottawa Field Naturalists' Club, the most successful society of the kind in the Dominion, and more recently he suggested, and by his influence and energy accomplished, the formation of the important Association of Economic Entomologists of North America.

The first official recognition of his attainments was in 1885, when he was appointed Honorary Entomologist to the Department of Agriculture at Ottawa, and in that capacity, though much hampered by his duties in the library, he published a valuable report on the injurious insects of the year. Two years later his present position of Entomologist and Botanist to the Experimental Farms of the Dominion was conferred upon him. In

the ten years that have now gone by, he has done an enormous amount of valuable work, as shown in his annual reports and evidence before the Standing Committee of the House of Commons on Agriculture, his voluminous correspondence with farmers and fruit-growers all over the Dominion, and his addresses to Farmers' Institutes and other gatherings. No one in this country has done so much as he to instruct the people in a practical knowledge of their worst insect foes and the best methods of dealing with them, while probably no one but he could have given the Province of Manitoba the information and the advice that he has repeatedly afforded by his lectures, addresses, and publications on the noxious weeds of that portion of the Dominion. All his friends will, we are sure, unite with us in the earnest wish that he may long be spared to carry on his admirable work, which is of such vast importance, not only to those directly interested in the products of the soil, but to all the dwellers throughout this wide Dominion.

A GENERIC REVISION OF THE LACHNEIDÆ (LASIOCAMPIDÆ).

BY HARRISON G. DYAR, WASHINGTON, D. C.

The genera of the same regions are included in the present paper as in a former one on Hypogymnidæ (CAN. ENT., XXIX., 12). The palæarctic Lachneids of the old world have been admirably treated by Aurivillius (Iris, Dresden, vii., 121-185), and I am indebted to his work for valuable information, as well as to the works of Kirby and Hampson. In going over the literature I did not always confirm Kirby's types of the genera; but rather than disturb the matter again, I have accepted them as modified by Aurivillius; but with the restoration of Hübner's Tentamen names, I drop *Gastropacha*, as it is a synonym of *Lasiocampa*, being proposed in the same sense to include all the species of the family. Following Wallengren, I separate *catax* and *rimicola* from *Eriogaster* as defined by Aurivillius for convenience in the table, though I do not doubt that the venation is as variable as Aurivillius states (Iris, vii., 147). I cannot separate the new genus *Paralebeda*, Auriv., from *Odonestis* by anything that is stated.

The oldest plural term for the family is again Hübner's *Lachneides*, and must form the family name as shown by Grote.

The synoptic table is followed by a list of genera and species. Only those species are placed which I have either seen or could determine from recent works :

1. Secondaries with veins 7 and 8 from intercostal cell, the bar short, or vein 7 from the subcostal vein.....2.
- Secondaries with very large intercostal cell, vein 7 near 6; the bar long.....23.
2. Primaries ♀ long and narrow, apex produced3.
- Primaries broader.....5.
- Wings of female absent.....30.
3. Primaries with veins 8 to 10 stalked.....*Bhima*.
- Primaries with vein 8 not stalked.....4.
4. Secondaries with veins 4 and 5 stalked... ..*Taragama*.
- Secondaries with veins 4 and 5 from the angle of the cell...*Suana*.
5. Costa of secondaries highly excised.....*Lebeda*.
- Costa of secondaries slightly or not at all excised.....6.
6. Primaries with veins 6, 7 free or stalked; 6 to 8 stalked; 4, 5 of secondaries as above.....7.
- Primaries with 6 to 8 stalked; 3 to 5 of secondaries stalked.*Syrastrena*.
- Primaries with veins 7 and 8 stalked.....21.
7. Outer margin of primaries evenly rounded8.
- Outer margin of primaries crenulate*Dendrolimus*.
- Primaries with the outer margin angulated and excised....*Bharettia*.
8. Palpi long.....9.
- Palpi short.....10.
9. Veins 6 and 7 of primaries from cell*Arguda*.
- Veins 6 and 7 stalked.....*Odonestis*.
10. Cell of both wings closed.....11.
- Cell of primaries closed, of secondaries open20.
- Cell of both wings open*Trabala*.
11. Very large (80 to 110 mm.); primaries rather elongated..*Pachypasa*.
- Smaller, primaries trigonate; veins 4 and 5 of secondaries from the cell.....12.
12. Female with large, thick, hairy anal tuft.....*Eriogaster*.
- Female without this tuft.....13.
13. Veins 9 and 10 of primaries on a stalk half way to apex or less...14.
- Veins 9, 10 on a stalk more than half way to apex of wing.....18.
14. Small species, wings short, 7, 8 of secondaries stalked from narrow and very small intercostal cell.....17.

- Moderate sized, 7, 8 from distinct, elliptical, intercostal cell. 15.
 Moderate sized ; veins 6 to 8 of primaries stalked. . . *Edwardsimemna*.
15. Sexes similar, wings broad. 16.
 Sexes dissimilar, wings more elongate. *Gloveria*.
16. Intercostal cell of secondaries half as long as discal cell. . . *Lasiocampa*.
 Intercostal cell of secondaries shorter. *Macrothylacia*.
17. Veins 4 and 5 of secondaries from angle of cell. *Trichiura*.
 Veins 4 and 5 of secondaries stalked. *Chilena*.
18. Vein 8 of primaries from cell ; 4, 5 of secondaries from cell *Pacilocampa*.
 Vein 8 on a stalk ; 4, 5 of secondaries from cell ; antennæ short . 19.
 Vein 8 on a stalk ; 4, 5 of secondaries stalked. *Hypopacha*.
19. Thorax evenly haired. *Artace*.
 Thorax or base of abdomen with a patch of long spatulate hairs. *Tolype*.
20. Outer margin of both wings crenulate *Crinocraspeda*.
 Outer margin entire. *Malacosoma*.
21. Primaries with vein 6 from the cell 22.
 Primaries with vein 6 stalked with 7 and 8 *Alompra*.
22. Female with a large abdominal tuft of hairs ; veins 4, 5 of secondaries from cell. *Lachneis*.
 Female without this tuft ; veins 4, 5 of secondaries stalked . . . *Kosala*.
23. Primaries with the stalk of 9, 10 short, less than half way to apex . 24.
 Primaries with the stalk long, more than half way to apex. . . . 27.
 Primaries with the stalk reaching the apex, vein 10 absent. *Heteropacha*.
24. Primaries short, apex rounded. *Lenodora*.
 Primaries longer, apex square or acute. 25.
25. Palpi long *Cosmotriche*.
 Palpi short 26.
26. Outer margin of primaries crenulate ; head prominent. . *Selenephra*.
 Outer margin entire ; head sunken. *Diplura*.
27. Secondaries with vein 3 from the cell. 28.
 Secondaries with veins 3 to 5 stalked *Estigena*.
28. Palpi long ; anal angle of primaries slightly emarginate. 29.
 Palpi short ; anal angle of primaries with a square notch. *Epicnaptera*.
29. Primaries produced at apex, outer margin very oblique. *Stenophylloides*.
 Primaries broader ; outer margin convex, crenulate. *Eutricha*.
30. Fore wings of male with 12 veins ; female without woolly anal tuft. *Eustaudingeria*.

- Fore wings with 11 veins ; female with woolly anal tuft. *Chondrostega*.
- Bhima*, Moore.
 undulosa, Walk.
Taragama, Moore.
 siva, Lef.
 dorsalis, Walk.
Suana, Walker.
 concolor, Walk.
Lebeda, Walker.
 nobilis, Walk.
Syrastrena, Moore.
 minor, Moore.
Dendrolimus, Germar.
 . pini, Linn.
Bharella, Moore.
 cinnamomea, Moore.
 flammans, Hampson.
Arguda, Moore.
 flavivittata, Moore.
 bherola, Moore.
 rosea, Hamps.
 vinata, Moore
 rectilinea, Hamps.
 decurtata, Moore.
 albigutta, Walk.
Odonestis, Germar.
 pruni, Linn.
 hyrtaca, Cram.
 punctata, Walk.
 latipennis, Walk.
 aconyta, Cram.
 nanda, Moore.
 fulgens, Moore.
 lidderdahlui, Butl.
 ampla, Walk.
 undans, Walk.
 repanda, Walk.
- recta, Walk.
 obliquifascia. Swinhoe.
 plagifera, Walk.
Trabala, Walker.
 vishnu, Lef.
 irrorata, Moore
Pachypasa, Walker.
 otus, Drury.
Trichiura, Stephens.*
 crategi, Linn.
 ilicis, Ramb.
 khasiana, Moore.
Chilena, Walker.
 similis, Walk.
 strigula, Walk.
Gloveria, Packard.
 arizonensis, Pack.
 dentata, Hy. Edw.
 ohvacea, Hy. Edw.
 venerabilis, Hy. Edw.
 gargamelle, Strecter.
 diazoma, G ote.
 Howardi, Dyar.
 dolores, Neum. & Dyar.
Lastocampa, Schrank.
 trifolii, Esper.
 quercus, Linn.
Macrothylacia, Rambur.
 rubi, Linn.
Edwardsimemua, Neum. & Dyar.
 jalapæ, Hy. Edw.
Pacilocampa, Stephens.
 populi, Linn.
Artace, Walker.
 punctistuga, Walk.

*This name should not be confounded with *Trichiura*, Hubn., a genus of the Euchromiidae.

- Tolyte*, Walker.
 velleda, Stoll.
 distincta, Moore.
 laricis, Fitch.
 brevicrista, Dyar.
Hypopacha, Neum. & Dyar.
 grisea, Neum.
Crinocraspeda, Hampson.
 torrida, Moore.
Malacosoma, Hübner.
 neustria, Linn.
 franconica, Esp.
 intermedia, Mill.
 alpicola, Staud.
 castrensis, Linn.
 luteus, Oberth.
 testacea, Motsch.
 indica, Walk.
 americana, Fab.
 fragilis, Stretch.
 pluvialis, Dyar.
 ambisimilis, Dyar.
 californica, Packard.
 constricta, Stretch.
 distria, Hübn.
Alompra, Moore.
 ferruginea, Moore.
Lachneis, Hubner.
 catax, Linn.
 rimicola, Hubn.
Eriogaster, Germar.
 lanestris, Linn.
Kosala, Moore.
 sanguinea, Moore.
 modulata, Swinhoe.
 rufa, Hampson.
 flavosignata, Moore.
Heteropacha, Harvey.
 rileyana, Harv.
- Lenodora*, Moore.
 vittata, Walk.
 signata, Moore.
 semihyalina, Swinhoe.
Cosmotriche, Hubner.
 potatoria, Fabr.
 laeta, Walk.
 divisa, Moore.
 castanea, Hamps.
 signata, Moore.
 isocyma, Hamps.
 pyriformis, Moore.
 lineata, Moore.
Selenephra, Rambur.†
 lunigera, Esp.
Diplura, Rambur.
 loti, Ochs.
Estigena, Moore.
 pardalis, Walk.
Epicnaptera, Rambur.
 ilicifolia, Linn.
 suberifolia, Dup.
 tremulifolia, Hubn.
 americana, Harr.
 Dyari, Rivers.
Stenophylloides, Hampson.
 sikkima, Moore.
Eutricha, Hubner.
 quercifolia, Linn.
 populifolia, Esp.
 undulifera, Walk.
 sinuata, Moore.
 divaricata, Moore.
Eustaudingeria, Dyar.‡
 vandalicia, Mill.
Chondrostega, Lederer.
 pastrana, Led.
 subfasciata, Klug.
 farciana, Staud.
 hyrcana, Staud.
 palæstrana, Staud.

†Kirby (page 813) and Aurivillius are entirely at variance as to the type of this genus. I follow the latter author, not having seen the original work.

‡Staudingeria is preoccupied in the Pyralidæ.

NOTES UPON SPHINX CATALPÆ AT COALBURGH, W. VA.

BY W. H. EDWARDS, COALBURGH, W. VA.

I never had seen the imago of this species until the present year, and never saw the larva before 1896. Mr. Bruce tells me that it is a common species in parts of the Southern States, and that the eggs are laid in clusters, and the caterpillars are gregarious. In this paper I give simply my own observations. Early in August, 1896, I was asked what caterpillars were defoliating the Catalpa trees at Charleston, W. Va. It was said that some trees were completely stripped. I was unable to answer the question, as no caterpillar was shown to me. On my return home, I looked at my own Catalpa trees, and the first one that I happened on gave me a score or more of larvæ, one or two on a leaf, on the lower leaves of the tree. These larvæ were three to four inches long, and evidently had passed their last moult. One young tree, perhaps ten feet in height, with a top six feet in diameter, had been completely stripped of leaves. I found a single caterpillar of *Catalpæ* on it, to show what had done the mischief. I put the larvæ into a large flowerpot two-thirds filled with earth, and got, in a few days, some forty pupæ. Supposing these would go over to next year, I buried a few, and sent the rest to Mr. Bruce. In about two weeks he discovered that the imagoes had come out of his pupæ, and on examining mine the same result appeared.

On 4th October I discovered that a new brood of the larvæ was feeding, from one inch to one and three-quarters inches long; great numbers on a leaf. One had 23 larvæ on, and it seemed as if every leaf on the tree had more or less of them. I then went to a group of these trees at three hundred feet distance, and found both young and nearly full-grown larvæ; plenty of them. I reared thirty-six larvæ to pupæ, and all had changed by 23rd October. It was evident that there had been two broods of larvæ between middle of July and October, and it was probable that here was a most destructive species newly come into this region, that must have at least three broods in the season. I expected to see the trees stripped early in 1897, and that every Catalpa leaf thenceforward would have a struggle to live.

In spring of 1897 the first imago from these pupæ emerged 18th May, and by 25th I had nine, every one of them males. Of my 36 pupæ this was all the outcome. During the year I watched the Catalpa trees, but found no larvæ of the Sphinx, and no traces of them. The species, there.

fore, disappeared as suddenly as it came, and we hope to see it no more. I inquired in Charleston, but could learn of no appearance of the larvæ there. Certainly no Catalpæ trees had been defoliated.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in London on the 12th and 13th of October last, when the following were elected officers for the year 1897-8:

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ON CUTEREBRA EMASCULATOR, WITH DESCRIPTIONS OF SEVERAL ALLIED SPECIES.

BY D. W. COQUILLET, WASHINGTON, D. C.

Cuterebra emasculator, Fitch.—This species was supposed by Dr. Brauer to be the same as his *C. scutellaris*, but an examination of Fitch's type, now the property of the National Museum, discloses the fact that it is identical with *C. fontinella*, Clark. When describing the hairs of the thorax as yellowish, Dr. Fitch had evidently examined them in a very bright light, under which conditions they have a deceptive yellowish appearance, but in reality are altogether black.

The following five species, which appear to be undescribed, belong to the same group as *fontinella*, in which the hairs of the middle of the mesonotum are black. They may be tabulated as follows :

1. Abdomen wholly polished, destitute of pollen. 2.
 Abdomen partly opaque pollinose, hairs of pleura largely or wholly yellowish. 4.
2. Hairs of pleura largely yellowish. 3.
 Hairs of pleura wholly black *tenebrosa*.
3. Pleura with a cluster of black hairs above the centre, front of male three times as wide as the distance between the two posterior ocelli *nitida*.
 Pleura destitute of a cluster of black hairs, front of male six times as wide, etc. *polita*.
4. With a cluster of black hairs above the centre of the pleura, front of male three times as wide as the distance between the two posterior ocelli *lepivora*.

Without this cluster, front of male six times as wide, etc. . . . *latifrons*.

Cuterebra lepivora, n. sp.—♂. Head black, destitute of light-coloured pollen, front at narrowest point three times as wide as distance between the two posterior ocelli, subopaque, an opaque streak of brownish pollen on each lower corner contiguous to the eyes, hairs of front black, several above the antennæ yellow; antennæ black, apical two-thirds of the arista and its hairs yellow; face and cheeks sub-shining, rugose, an opaque spot on each side of the face contiguous to the eyes, the hairs and those of the occiput pale yellow. Thorax black, subopaque, hairs of the dorsum black, a cluster above each wing and those of the pleura yellowish-white, a cluster of black hairs midway between the wing and the head; pleura opaque, two polished black spots above each front coxa; scutellum

black, its hairs also black. Abdomen shining steel-blue, the sides of the first three segments partly brown pollinose, on the second segment extending nearly half way to the middle of the dorsum, leaving numerous spots uncovered and polished, hairs of the abdomen, including those of the venter, black. Legs black, the femora toward their bases whitish pollinose, the hairs wholly black. Wings and calypteres brown.

♀. Same as the male, with these exceptions: Front nine times as wide as distance between the two posterior ocelli; face and cheeks smooth, opaque brownish pollinose, the upper part of the face and two spots each side, one of which is contiguous to the eye, the other nearly midway between it and the mouth, polished black. Hairs of venter of abdomen largely yellowish-white. Front femora each bearing a cluster of whitish hairs on the under side a short distance before the tip.

Length of male, 19 mm.; of female, 22 mm. One specimen of each sex. The female was bred by the writer from a larva found in a cotton-tail rabbit obtained near Anaheim, Cal. The male was collected July 28, 1896, at Corbett, Wyoming, by Mr. R. P. Currie.

Cuterebra nitida, n. sp.—♂. Differs from the above description of the male of *lepivora* only as follows: Front subshining, two opaque spots of brownish pollen each side contiguous to the eyes; no yellow hairs above the antennæ. Abdomen wholly polished, destitute of pollen. Front tibiæ at base of outer side white pollinose. Length, 19 mm. Los Angeles Co., Cal. One specimen, collected by the writer in September.

Cuterebra latifrons, n. sp.—♂. Differs from the above description of the male of *lepivora* as follows: Front at narrowest part six times as wide as the distance between the two posterior ocelli; two opaque spots of brownish pollen each side, contiguous to the eyes, face destitute of opaque spots. Pleura destitute of a cluster of black hairs. Abdomen reddish-brown, the last three segments partly covered with brownish pollen, leaving numerous spots uncovered and polished. Front tibiæ white pollinose on the base of the outer side. Length, 17 mm. Los Angeles Co., Cal. One specimen, captured by the writer in June.

Cuterebra polita, n. sp.—♂. Same as *latifrons*, except that the lower part of the front and upper part of the face are narrowly bordered with gray pollen next the eyes, and the abdomen is violet-black, wholly polished and destitute of pollen, femora destitute of whitish pollen. Length, 16 mm. National Park, Wyoming. One specimen, collected August 3, by Mr. H. G. Hubbard.

Cuterebra tenebrosa, n. sp.—♂. Differs from *lepihora* as follows : Front at narrowest point five times as wide as the distance between the two posterior ocelli ; two spots of brownish pollen on each side of lower part of the front next the eyes, and two on the sides of the face, but one or more of them sometimes wanting ; hairs of the head and thorax wholly black. Abdomen wholly polished and destitute of pollen. Tibiæ white pollinose at the base of the outer side.

♀. Same as the male, except that the front is seven times as broad as the distance between the two posterior ocelli.

Length of male, 20 mm.; of the female, 20 to 22 mm. Colorado, San José (Mrs. A. E. Bush), and Siskiyou Co. (James Behrens), Cal.; and Perry, Oregon. Eight males and three females.

All of the specimens upon which these descriptions are founded are now the property of the National Museum.

FURTHER OBSERVATIONS ON *PAPILIO BAIRDII*, EDW.

BY W. H. EDWARDS, COALBURGH, WEST VA.

On the 8th of June, 1897, I received from Mr. David Bruce, at Glenwood Springs, Colorado, about 30 eggs, laid by a typical female of *P. Bairdii*, confined over the food plant, *Artemisia dracunculoides*. These soon began to hatch, and I gave them fennel, on which they thrived.

The first moult was passed on 13th and next days, the second moult on 15th and next days. Two passed the third moult on 17th, and the fourth on 19th and 20th. By 22nd all were past fourth moult. The first pupa formed 24th, and by 25th, a. m., there were half a dozen pupæ. The last larva pupated on 28th, and I had in all 16 pupæ.

The first imago came out 4th July, the last July 9th, and one pupa will go over to 1898 or 9.

The outcome was as follows :

1 typical *Oregonia* ♂.

1 " " ♀.

2 typical *Brucei* ♂, the cells of fore wings black instead of yellow, and the other characteristic marks of *Brucei* as set forth in my paper in CAN. ENT.; also in vol. 3, Butt. N. A.

7 typical *Bairdii* ♂.

1 " " ♀.

Three pupæ dead.

Thus all three forms came from eggs of the single form *Bairdii* ♀.

TWO NEW SPECIES OF ORTHEZIA.

BY J. D. TINSLEY, MESILLA PARK, NEW MEXICO

Orthezia cheilanthi, n. sp.—Adult ♀. Length, 3.5 mm. Width, 3–3.5 mm. Length + ovisac, 6–8 mm. Width of ovisac, 3–4 mm. Body above covered with white secretion, which forms lateral and subdorsal longitudinal keels. A well-defined subdorsal furrow between the keels and the lateral margin formed by 3 or more rows of plates; these are smaller than the projecting marginal plates, which are flattened; caudal plate and the 3 or 4 plates on each side of it very little longer than the lateral plates. The structure of the secretion is compact; in most of the other species of *Orthezia* it is fluffy.

Ovisac with distinct longitudinal ridges above and nearly as distinct ridges below.

Legs and antennæ sepia brown, of nearly same shade throughout. Tibia about as long as femur, tarsus about half as long as tibia, claw only slightly curved. Femur 532 μ , tibia 471 μ , tarsus 289 μ , claw 90 μ .

Tibiæ and tarsi with several rows of spines. Antennæ (Fig. 1) with 8th joint longest, then 3rd, then 1st, then 4th, 5 and 7 next and subequal, 2 and 6 shortest and subequal. For measurements see figure. Formula 8314(57)(26).

Derm with numerous small spines.

Larvæ.—♀. Legs and antennæ sepia brown.

Tibiæ decidedly longer than tarsi, claw long and slender, slightly curved.

Antennæ 6-jointed; 6 the longest, but not so long as 3 + 4 + 5; 3 usually longer than 4 or 5; 5 shortest. Formula 631245.

Habitat.—In Canons of the Organ Mts., New Mexico, on *Cheilanthes Fendleri*, Hook, at altitudes from 4,500 to 7,500 feet. The adult ♀ is usually found just beneath the surface of the soil, and the larvæ occur mostly upon the rachises of the fern.

Remarks.—This species is closely allied to *O. annæ*, Ckll., but differs from it in the following points:

- (a) The secretion is more compact; the space between the subdorsal keels is wider and the keels are not so prominent. The marginal plates are more flattened.
- (b) Colour of legs and antennæ is uniform, while in *annæ* the femora and tarsi are much darker than the tibiæ.



FIG. 1.

(c) In *annæ* joints 1 and 2 of antennæ are equal, and 3 is a third longer than 2, antennal formula being 83(12)(45)(67).

Orthesia graminis, n. sp.—Adult ♀. Length, 2–3 mm. Width, 2 mm. Length + ovisac, 6–13 mm. Width of ovisac, 2.5 mm. Colour, piceous. Body above with subdorsal and lateral keels; between the subdorsal and lateral keels the body is naked and shows up as a black band on each side, so that the dorsum appears to have three white longitudinal bands and two black longitudinal bands. Subdorsal keels slightly widest posteriorly. Lamellæ of lateral keels lengthening posteriorly. All the posterior lamellæ about subequal, and free from the firm chalk-white ovisac, which is longitudinally ridged dorsally and nearly smooth ventrally.

Legs and antennæ dark sepia brown.

Terminal segment of antenna darker than the others.

Tibia slightly longer than the femur; tarsus slightly more than half as long as the tibia.

Claw large, nearly straight. Femur 547 μ , tibia 593 μ , tarsus 320 μ , claw 83 μ .

Spines on tibia and tarsus small and not very numerous.

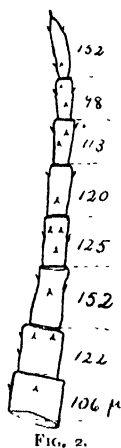
Antennæ (Fig. 2) with 3rd joint usually longest, although 3 and 8 may be subequal; 7th joint always the shortest; the other joints vary very much in their relative lengths in different specimens, so that no accurate formula can be given.

For measurements see figure. The antennæ have a few small, scattered spines.

Larvæ.—The larvæ appear to have 3 black and 4 white longitudinal bands, since the body shows up black between the subdorsal, and the subdorsal and lateral keels. Legs and antennæ sepia brown. Tibiæ and tarsi about subequal in length, both shorter than the femure. Claw slender and curved. Antennæ 6-jointed; 6 longest, but not quite so long as 3 + 4 + 5; 2 and 4 usually longer than 3; all very variable in relative lengths, so that no formula can be given.

Male unknown.

Habitat.—On culms and blades of grass, in the Mesilla Valley, New Mexico. These specimens were collected near the A. & M. College Farm, Sept. 26, 1897.



This species is related to *O. sonorensis*, Ckll., and *O. nigrocincta*, Ckll., but has a much longer ovisac than either of these. The arrangement of the subdorsal lamellæ is also different, and more black shows on the dorsum than in either of those species.

NOTE ON TRIGONALYS CANADENSIS, HARGTN.

BY GEO. W. TAYLOR, F. R. S. C., GABRIOLA ISLAND, B. C.

Wishing to obtain a series of males of our common ground wasps, I paid a visit on the afternoon of October 21st to a large nest of *Vespa occidentalis*, Cresson, that I had noted some time previously near my house. The day was dull and the wasps sluggish, but quite a number of males and perfect females were crawling about around the entrance to the nest. Among the wasps were some specimens of a conspicuous yellow and black Hymenopteron unlike anything that I had seen before. I secured nine specimens, all males, and on my return home easily made out by the help of Cresson's Synopsis that the insects belonged to the genus *Trigonalys*. The next step was to turn to Harrington's paper in the CAN. ENT., XXVIII., page 108, and compare my specimens with the description of the unique *Trigonalys canadensis*. Unfortunately, all my specimens were males, while Harrington's type was a female. Consequently the description did not quite fit, but on the following day I took three females and satisfied myself that the species I had found was the genuine *T. canadensis*.

As the wasps' nest, and a second one not 50 yards away from it, were quite near to my house I was able to visit them several times each day, and my captures of *Trigonalys* were as follows :

At nest No. 1.	Oct. 21,	3 p. m.,	9 ♂.
	22,	3 p. m.,	2 ♂ and 2 ♀.
	24,	9 a. m.,	1 ♂.
	25,	3 p. m.,	1 ♂.
	26,	10 a. m.,	1 ♂.
At nest No. 2.	Oct. 22,	3 p. m.,	1 ♂ and 1 ♀.
	23,	9 a. m.,	2 ♂.
	24,	2 p. m.,	3 ♂.
	25,	10 a. m.,	1 ♂.
	25,	3 p. m.,	1 ♀.
	26,	3 p. m.,	1 ♂.

On Oct. 27 the nests failed to produce any *Trigonalys*, but I captured one ♂ at rest on the leaves of an apple tree much frequented by wasps and growing about 100 yards away from the nests.

Total specimens, 23 ♂ and 4 ♀.

After the last-named date the weather became cold and wet, and no more *Trigonalys* appeared; so after waiting a day or two, I dug up the nests, but was not able to detect any signs of the parasites. It will be noticed that the flies were not commonly taken in the afternoons, and in all cases (except the solitary specimen on the apple tree) they were at rest on the grass and weeds within a few feet of the entrance to the wasps' nest.

The type of *T. canadensis*, as may be seen by reference to the paper above cited, was taken at Victoria (75 miles south of this place) from what was supposed to be the nest of the same species of *Vespa* (*V. occidentalis*) which had built a suspended nest on the under side of a veranda roof.

As the ♂ of *T. canadensis* differs from the ♀ in several details, I have asked Mr. Harrington to kindly append a description of the former sex to the present note. My 4 pairs of *T. canadensis* have been disposed of as follows: 1 to Dr. Fletcher, 1 to Mr. Harrington, 1 to the Entomological Society, and one reserved for my own collection. The remaining ♂ specimens will be gladly given to any hymenopterists who may care to ask for them.

ADDENDUM BY W. H. HARRINGTON, F. R. S. C., OTTAWA.

In accordance with the wish expressed by my esteemed friend in the foregoing most valuable note on the occurrence of these rare and interesting insects, I have prepared, from the three pairs submitted for inspection, a description of the male, for in the original description (as is evident) the word male should read female.

Trigonalys canadensis, Hargtn.—Male. This sex differs in general appearance from the female, chiefly in the larger and broader abdomen, which makes it look much more robust. The following differences are noted: Antennæ 19-jointed, with the pedicel rufous, and terminal joints sub-serrate, very much like those of the antennæ of a ♂ *Vespa*, but much slenderer. Mandibles more prominent, with the teeth rufous. The yellow markings of thorax are more conspicuous, and are as follows: Angle of prothorax; spot at each humeral angle of mesonotum, two lunate spots on scutellum, and a smaller spot on each side between scutellum and base of

anterior wing; post-scutellum and a short, paler line in the crenate suture at each side of the same; angles of the metathorax, and two minute dots on pectus. The abdomen shows an additional segment, although it—the seventh—is very small, and in one specimen scarcely visible. Viewed from above, the abdomen appears almost quadrate, and shows little more than the broadly flattened segments two and three, which are sub-equal in size, the terminal segments being deflexed and somewhat recurved under the venter. Segments two to five have broad yellow sub-basal bands, the edges of which are uneven; that on the first segment is almost bracket-shaped; the sixth segment also shows more or less yellow at base. The venter has double yellow spots on segments one to four, those on the first two being large and irregular in shape. The second ventral segment has a prominent median truncated projection, and the third segment has a similar projection, but it is almost hidden beneath segment two; segments four and five are visible only as narrow margins; the margin of the sixth segment is deflexed so as to form two sub-triangular keels in front of the projections from second; the seventh is cleft longitudinally. From the manner in which the terminal segments are deflexed and bent inwardly, these features are not readily seen in all specimens. Described from three specimens from Gabriola Island, B. C.

The three females accompanying these males are all somewhat larger than the type, two being much more robust; the markings are, however, identical, except that one of the larger specimens shows faintly the yellow dots (mentioned for the ♂) on front of mesonotum and on scutellum, and between it and the wings. The other shows only indications, still fainter, of the spots between the scutellum and wings.

The wasps sent by Mr. Taylor are female, worker and male of *Vespa occidentalis*, Cresson, and in examining them I notice that the eyes of the male are more remote from the mandibles than are those of the female. Mr. Taylor suggests that the wasp from whose nest the Victoria ♀ was taken was *V. Fernaldi*, Lewis, but I have not seen any examples of that species from Victoria.

MICROCÆLIA DIPHTHEROIDES, GROTE.

Larva.—Cylindrical, green, smooth, the setæ very fine and inconspicuous, single, normal for the Noctuidæ. White dorsal and subdorsal lines, narrow, crinkly edged; white dots at tubercles i. and ii.; a pink-red stigmatal line, edged with white below, distinct only at the ends of the body. (One blown specimen, Solidago, 5/9 '84, No. 3415. Coll. U. S. Nat. Mus.) This larva has no affinity with *Acronycta*.

HARRISON G. DYAR.

A NEW PARASITE OF THE HARLEQUIN CABBAGE BUG.

BY L. O. HOWARD, WASHINGTON, D. C.

The great damage which has been done to cabbage and other cruciferous plants by the harlequin cabbage bug (*Murgantia histrionica*) in its spread towards the north-east renders of interest any comments upon its natural checks. Professor H. A. Morgan, of the Louisiana Agricultural Experiment Station at Baton Rouge, has reared in considerable numbers a Proctotrypid parasite from the eggs of this destructive insect, which was named by Mr. Ashmead *Trissolcus murgantiae*. With commendable enterprise, Professor Morgan has sent eggs of the cabbage bug to various Experiment Station Entomologists situated in localities which the *Murgantia* has more or less recently invaded, and to which it seems probable that the parasite has not yet followed it. Professor Webster, of Ohio, has announced that he is trying to introduce this beneficial insect, and Professor Johnson, of Maryland, is making the same effort with Professor Morgan's help.

As preliminary to this introduction experiment, Professor Johnson has made an effort to ascertain whether *Murgantia histrionica* is already parasitized in its egg condition in Maryland. In the course of this effort he has bred several specimens of a Chalcidid parasite which he has asked the writer to name. Examination shows this insect to belong to the genus *Encyrtus*. It is interesting to note that no *Encyrtinae* are known in Europe to live in heteropterous eggs. In this country, however, several species probably have this habit. Mr. Ashmead has reared a species from the eggs of *Anasa tristis*, in Florida, and in the Insectary of the Department of Agriculture at Washington species have been reared from the eggs of *Prionidius cristatus*, received from Texas, and from the eggs of an unknown heteropterous insect found upon pine in California. The species reared by Professor Johnson differs from any of these. It is very closely related to *Encyrtus mitratus*, Dalman, of Europe, the host relations of which are not known. The specimens in collections have been captured. It may ultimately prove to have been reared from heteropterous eggs.

As unsatisfactory as it is to describe isolated species, it is sometimes desirable, as in this instance. The parasite has some importance, and Professor Johnson wishes to refer to it definitely by name. The following description is therefore submitted :

Entegrus Johnsoni, n. sp.

Female. — Length, 0.8 mm.; expanse, 2.1 mm. Belongs in the *E. mitratus* group. Antennal scape cylindrical; ovipositor scarcely extruded; wings hyaline, marginal vein lacking. Pedicel of the antenna three times as long as wide, nearly cylindrical, nearly three times as long as first funicle joint; first funicle joint a little longer than wide, remaining funicle joints increasing slightly in length; entire funicle subcylindrical; club as long as four preceding funicle joints together, somewhat swollen, ovate; entire flagellum slightly hairy. Body compact; thorax somewhat convex, abdomen rotund; mesonotum with short sparse white pile; vertex moderately narrow; ocelli forming right angle triangle; mesonotum finely transversely shagreened; mesoscutellum finely transversely shagreened at base, nearly smooth at tip; axillæ well separated at tip. General colour, metallic green; mesoscutum highly lustrous; axillæ and base of scutellum more opaque; tip of scutellum and abdomen shining; reflections of head violaceous; antennæ dark brown, nearly black; all legs uniformly light honey-yellow.

Male. — Closely resembles female, except in the following particulars: Antennæ, which are light brown in colour, have an obconical pedicel of which the breadth nearly equals the length, and which is shorter than funicle joint 1; first funicle joint a little longer than second, remaining joints subequal in length; all of funicle and club with long hairs; club not widened and nearly as long as two preceding funicle joints together; abdomen broadly subtriangular.

Type No. 1424. U. S. Nat. Mus. (Coll. Dept. Agric.)

Described from two females, one male, reared by W. G. Johnson, College Station, Md., Aug. 22, 1897, from eggs of *Murgantia histrionica*.

NOTES AND OBSERVATIONS ON SEVERAL SPECIES OF DIPTERA.

BY F. M. WEBSTER, WOOSTER, OHIO.

Rhamphomyia mutabilis, Loew., has several times been observed preying upon *Bibio pallipes*, Say. I once saw hundreds of the former on a picket fence that had recently been whitewashed, and all appeared engaged in capturing the latter; at any rate hardly one could be found that was not engaged in sucking the life out of a victim. In one case the sexes were pairing while the female was luncheoning upon a recently captured *Bibio*.

Pipiza modesta, Loew., was reared from apple twigs infested by *Schizoneura lanigera* (Hausm).

Pegomyia bicolor, Weid., was reared from larvæ mining in the leaves of a species of *Rumex*.

Leucopsis bella, Loew., was reared from a melon louse, probably *Aphis gossypii*, Glover. Have reared apparently this species from Aphis on cherry.

From the same host was reared a species of *Cecidomyia*, the larvæ of which were observed feeding upon the Aphis. I have reared either this or a similar species from Aphis on plum leaves.

Masicera eufitchiæ, Towns., was reared from the larvæ of *Ænecra distincta* and *Teras minuta*, Rob., var. *cinderella*, Riley.

Euphorocera clavipennis, Maq., was reared from larvæ of *Datana ministra*, Dru.

Paraplagia spinosula, Bigot, was reared in numbers from larvæ feeding on alder. The host was the larvæ of some species of Sawfly, the adult of which was not reared.

The determinations were made by Mr. Coquillett by courtesy of Dr. L. O. Howard.

A NEW ORTHEZIA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Orthezia artemisiæ, n. sp.—♀. Immature form. Antennæ and legs piceous. Body covered with white secretion. Dorsum with two rows of dentiform tufts; the first four directed forwards; the remaining seven, decreasing in size caudad, directed backwards. Nine lateral tufts; the first, on a level with the second dorsal tufts, at right angles to the body; the others directed backwards, and about of equal length, except the last two, which are longer and narrower, the last being longest. Caudal tufts extending caudad of last lateral tufts.

♀.—Mature. Differs by having the lamellæ or tufts more elongated, the first dorsal erect, longer than broad; the remaining dorsal produced and no longer dentiform. The arrangement is now practically as in adult *O. urticæ* (L.), except that the first dorsal lamellæ are wide apart at tips, and the second dorsal lamellæ are smaller (instead of larger) than the third. The hindmost lateral lamellæ are also somewhat less produced than in *urticæ*. Antennæ and legs dark red-brown; antennæ 8-segmented, 3 longest; 5 a little longer than 4; 6 and 7 about equal, and shorter than

4; 8 about as long as 5. Length of insect, without ovisac $2\frac{1}{2}$ mm. Ovisac moderate, white, distinctly ribbed.

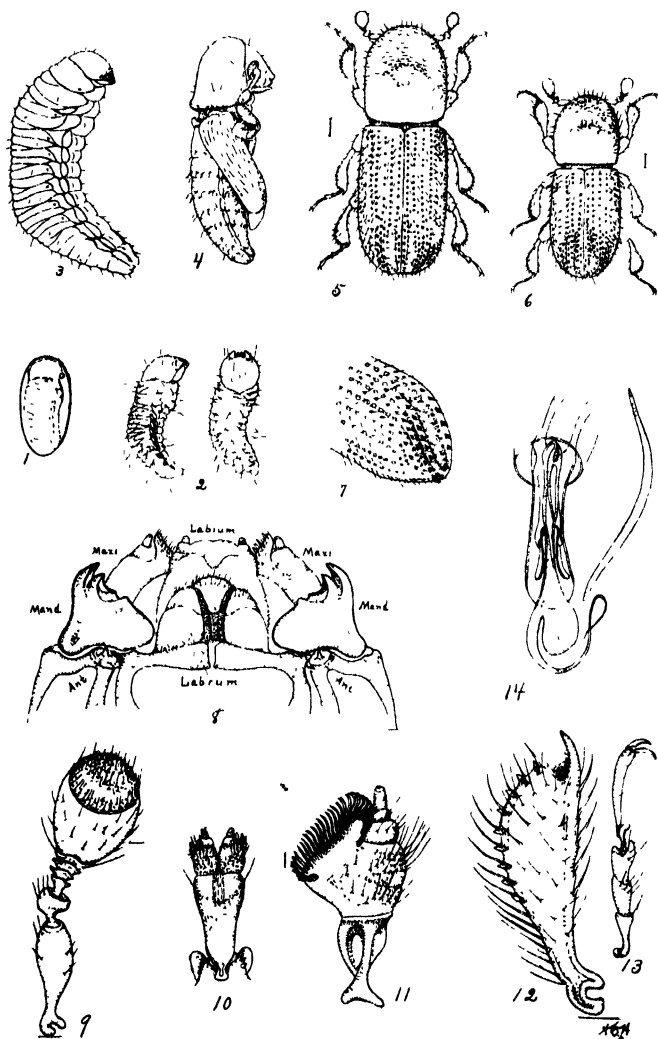
Hab.—Embudo, New Mexico, Sept., 1897, on sage-bush (*Artemisia*), together with *Dactylopius lichtensioides*, Ckll. (new to N. M., empty sacs only found), and *Lecaniodiaspis artemisiae*, Ckll., MS. (♀ scale 3 mm. long, reddish ochreous, tuberculate, dull, thoracic region with two prominent transverse crests; antennæ apparently absent in adult, in younger examples represented by small rounded bristly prominences, without visible joints.)

At Embudo I found also *Orthezia nigrocincta*, Ckll., on *Gutierrezia* high up on the cliff. With the two new species just described by Prof. Tinsley, and the present insect, New Mexico now possesses five species of *Orthezia*. *O. artemisiae* is nearest to *O. anna*, but the latter has the lamellæ less definitely formed, and differs also in the antennæ.

BOOK NOTICE.

INSECT LIFE: AN INTRODUCTION TO NATURE STUDY AND A GUIDE FOR TEACHERS, STUDENTS, AND OTHERS INTERESTED IN OUT-OF-DOOR LIFE.—By John Henry Comstock, Professor of Entomology in Cornell University and in Leland Stanford Junior University. With many illustrations, engraved by Anna Botsford Comstock. New York: D. Appleton & Company; pp. 349, with six plates and many figures. Price, \$2.50.

In this little book Prof. Comstock has given us a treatise, not only of practical value to teachers and amateurs, but also one that the professional worker will find very handy to have just within reach, in order to settle some minor point that may suddenly present itself. Best of all, however, is the fact that the work is correct—a feature quite in contrast with some of the ordinary text-book entomology. There need be no hesitation about recommending this book to anyone, as its style, while not especially technical, is even more or less poetical, yet is never flippant or slipshod in expression. The illustrations are fine, and are not simply pictures, but help to simplify the text—almost anyone who is at all versed in entomology will at once recognize the Katydid on the cover. There is just one fault to be found with the book, and it is very doubtful if this is to be attributed to the author, and this is the title. A fascinating title may help to sell a novel, or some such work as that, but publishers should learn that this is not true with such books as this. However, it is no discredit to the author that his book should be found better than its title. For the present, and until there is something much better, I shall recommend this book to those who wish for a simple and accurate introduction to the difficult study of entomology. F. M. W.



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No. 2.

ON THE HISTORY AND HABITS OF THE "WOOD EN- GRAVER" AMBROSIA BEETLE XYLEBORUS XYL- GRAPHUS (Say), XYLEBORUS SAXESENII (RATZ.) --- WITH BRIEF DESCRIPTIONS OF DIFFERENT STAGES.*

BY A. D. HOPKINS, ENTOMOLOGIST, W. VA. AGR. EXPT. STATION.

The Ambrosia beetles of the Scolytid genus *Xyleborus* present many features of interest to the student of systematic and economic entomology', and in *Xyleborus xylographus* we find a cosmopolitan species of unusual interest.

History.

It was described by Say in 1826 from specimens "sent to him by the younger Rev. J. F. Melsheimer from the Melsheimer collection, with the manuscript names and notes by the elder Rev. F. V. Melsheimer." Say's erroneous reference to the habits and galleries of the species, published with the description, was (as suggested by Schwarz) due to his use of Melsheimer's notes on a different species, probably a *Pityophthorus*, *Pityogenes* or *Tomicus* species. This was the cause of much confusion in subsequent literature on the species. The *Tomicus xylographus* referred to at length by Dr. Fitch⁴, and subsequently quoted by Packard under *Xyleborus xylographus*, was evidently *Tomicus cælatus*, although the galleries illustrated by Fitch resemble the work of a *Pityophthorus* more than they do that of *T. cælatus*.

Some years after the publication of Say's description, Ratzburg⁵ described the same thing under the name *Xyleborus saxeseni*, which,

*Read by title before the W. Va. Academy of Science, Arts and Letters, Dec. 7th, 1897.

1. Ambrosia Beetles of the United States; H. G. Hubbard; Bull. No. 7, new series, U. S. Department of Agriculture, Div. of Entomology, 1897, pp. 9-30; also Year Book, 1896, pp. 421-430.

2. *Bostrichus xylographus*, Jour. Acad. Nat. Sci., Phila., 1826, Vol. V., p. 256.

3. Catalogue of Insects of Pennsylvania, 1806.

Quotation from Schwarz in Proc. U. S. Nat. Museum, Vol. XVIII., p. 610.

4. *Tomicus xylographus*, Fitch, 4th Rep. Ins. of N. Y., 1858, p. 716.

5. Bull. 7, U. S. Ent. Com., Insects Injurious to Forest and Shade Trees.

according to Eichhoff⁷, was in use in Europe over fifty years before it was determined that Say's name had priority. Schwarz⁸ had previously called attention to the probable priority of Say's name, and the confusion with reference to Say's description of the insect and galleries. The writer⁹ also referred to its identity with *saxeseni* in 1893, and published brief descriptions of the male in 1894¹⁰. This, with descriptions and notes by Zimmermann and Leconte¹, and the publications previously cited, includes about all of the literature in this country, but in Europe the literature is more voluminous and includes, under the synonym *X. saxeseni*, quite full accounts of its habits and distribution.

Geographical Distribution and Host Plants.

According to Eichhoff the distribution of this species extends over "the greater part of Europe, Canary Islands, Japan (?), and North America." The species is evidently indigenous to Central Europe, or wherever it infests the greatest variety of trees. Its recent or remote introduction into any country will probably be indicated by its preference for certain introduced or ornamental trees, and the extent to which it has acquired the habit of infesting indigenous trees.

In Europe, Eichhoff and other observers found that it not only infested the wood of oak, beech, birch, maple, poplar, linden, fruit, and other deciduous trees, but that different conifers were also attacked by it. Hubbard mentions that "it appears to be partial to rather hard wood, like oak, hickory, birch and maple, and is found wherever these trees grow, both in this country and Europe." The results of my observations here in West Virginia would indicate that it is confined almost exclusively to fruit trees, especially to the wood of the apple, in which I have found it to be exceedingly common in the vicinity of Morgantown. In my extended

6. Ratzburg Forstein, 1837, Vol. I., p. 168.

7. Letter from W. Eichhoff to Dr. C. V. Riley in 1892, published in Proc. U. S. Nat. Museum, Ibid p. 609, from which we quote the following: "There cannot be the slightest doubt that the species you sent me as *Xyleborus xylographus* Say . . . is identical with the European *X. saxeseni*, Ratzburg. It is certainly remarkable that this synonymy comes to light only now, and that Ratzburg's name has to be suppressed after it has been in use for more than fifty years. *X. fini*, Eich., must now again take its rank as a distinct species."

8. Ento. Amer. II., p. 41.

9. Bull. 31, W. Va. Agr. Expt. Station, p. 136.

10. Sexual Characters in Scolytidæ, CAN. ENT., Vol XXVI., p. 279. The male had been previously described by Wisemann, Stett. Ent. Zeit., 1846, p. 24.

1. Trans. Amer. Ent. So., Sep. 1868, p. 145 and 160.

search for wood and bark beetles of all kinds in different sections of the State, I have only one record of this species or its work in the wood of an indigenous tree, and that was in a hemlock drift log, near an old orchard in which the insect was abundant. Fitch, Leconte and Packard referred to the abundance of *X. xylographus* and *Tomicus xylographus* under the bark of pine, but they were evidently referring, as Say did, to the habits of *Tomicus calatus*, which, while a true bark-boring beetle, is also a wood engraver.

Breeding and Feeding Habits.

The habits of *X. xylographus* are quite fully and accurately described by Eichhoff¹, and recently Mr. Hubbard, in his excellent paper on the ambrosia beetles of North America, has contributed additional information, especially with reference to the ambrosia fungus upon which it feeds, from all of which, together with what I can add from personal observations, we are enabled to present the following :

The fertilized females pass the winter in their brood chambers and emerge in the spring (April and May, near Morgantown, W. Va.). They are then attracted to sickly, dying or felled trees, in the living or moist dead wood of which they prefer to excavate their brood galleries. A crevice or opening in the bark, such as may be made by other insects, or, as I have observed, those made by the yellow-bellied woodpecker, but more commonly the edge of a wound, or a dead place on a living tree, is selected as a favourite point of attack. Here a female will commence the excavation of a mine, and after she has penetrated the wood a short distance, another female (as I have observed) will come to her assistance, one working at the excavation, while the other guards the entrance and assists in expelling the borings. The primary or main gallery is usually extended into the heartwood before eggs are deposited. When the primary gallery is completed (according to Hubbard) a bed is provided on the sides of the gallery for the propagation of the special species or variety of ambrosia fungus which is to furnish food for the future broods. The first set of eggs are few in number (five to ten) and are placed without any protection on the sides near the end of the main gallery, or in cavities or short branching galleries (Plate 3, fig. 7, 8), one half to one inch from the end, where, upon hatching, the young larvæ find a supply of ambrosial food. After the first set of larvæ have attained considerable size, another set of eggs are deposited, and so on at intervals until a

1. W. Eichhoff, European Barkenkafer, Berlin, 1881, pp 280-281.

large family is reared, in which eggs, larvæ of all stages of development, pupæ, and young and old adults are found crowded promiscuously in leaf-like brood-chambers, which are continually broadened or extended by the adults and possibly by the larvæ, to make room for the increase. It appears that the brood-chambers are broadened and extended by the adults, and that the borings, mixed with the fungus, are softened and furnish additional food for the larvæ and young beetles.'

Mr. Hubbard records the discovery of a death chamber, or a kind of catacomb, in which the dead mother beetles and other dead friends or foes of a large colony are consigned by the survivors. In some fresh specimens of galleries before me (Plate 3, fig. 2 b b), I find the same thing, but it appears that in addition to a resting place for the dead, it is also utilized for the disposal of all objectional and refuse matter, which, owing to the crowded condition of the chamber, cannot be conveniently expelled from the entrance. One of the males found in this set of chambers was excavating a burrow in the mass of material in the death or garbage chamber. Whether he was excavating his own tomb, or simply providing bachelor quarters, I cannot say.

The proportion of males in this, as in all other species of the genus *Xyleborus*, is remarkably small. There are usually not more than three males in the largest colonies, or groups of brood-chambers. It would appear from observations made by Swiner and Eichhoff in Germany, and the numerous colonies I have examined in this country, that there is, on an average, about one male to twenty females. The males have no wings, therefore probably do not leave the brood-chambers, but remain with the over-wintering colony until all have emerged in the spring. They are then left to be smothered in overabundant ambrosial food, or to the tender mercies of predatory insect enemies which had previously been prevented from entering the brood-chambers by one or more female sentinels at the entrance. A few females may emerge from time to time during the summer to start new colonies, but from the excessively crowded condition of the brood-chambers during the fall and winter months, it

1. NOTE.- In a brood-chamber before me just cut from a near-by apple tree, I find a pupa minus an abdomen. No predaceous enemies can be found, but two or three half-grown larvæ are in such a position as to make the circumstantial evidence quite plain that they are to blame for the mutilation. The remaining portion of the pupa is in a normal condition, which would indicate that the attack had been recent and when the victim was alive. This would also indicate that the helpless pupa may furnish food for the larva in case of a scarcity of ambrosia, or that they may be thus disposed of to prevent an overcrowded brood-chamber.

would appear that the older adults of the broods excavate branching chambers in which new broods are developed, and that in these old and new chambers they all pass the winter.

Enemies.

A number of predaceous beetles and their larvæ may find their way into the brood-chambers at unguarded moments and destroy a portion or all of the colony. This, like other species of ambrosia beetles, appears to be aware of the danger from this source, at any rate, from the time the first eggs are deposited until all the individuals of a colony have developed and emerged from the brood-chambers, one or more adult females serve on guard duty at the entrance, where their armed elytral declivity (as shown in Plate 2, fig. 7 ; Plate 3, fig. 9) completely fills the entrance gallery, thus presenting an impenetrable barrier against intruders. It is therefore only at unguarded moments that the enemy can enter, except, perhaps, the very young, microscopic larvæ of the predaceous beetles, which may possibly pass the sentinels unobserved. This guard duty is an interesting feature of intelligence in the habits of all Scolytids. In the case of bark beetles and other species in which the sexes are about equally divided, the male is the sentinel, while the female excavates the brood gallery. Perhaps there is no better example of unselfish devotion to paternal duty than the male bark beetles, since they not only spend their lives on guard, but die at their posts in order that their dead bodies may continue to blockade the entrance to the brood galleries. In Xyleborous, and others in which the females greatly predominate, one or more females serve on guard duty.

The excessively crowded brood-chambers doubtless offer favourable conditions for diseases, which may, as indicated by evidence before me¹, destroy an entire colony.

Relation of the Insect to the Health of the Trees Infested by It.

Eichhoff was undecided as to whether or not the species did any damage to the trees infested by it, but mentioned that it might prove destructive to orchards or nursery trees. Hubbard² states that it "breeds only in dying trees," but does much injury to the timber, causing defects in the wood, and the writer⁴ mentioned that it probably hastens the death

1. In a brood-chamber before me a number of dead larvæ and pupæ are found, which have evidently died quite recently from a disease of some sort which cannot at present be studied or determined.

2. European Bark Beetles, l. c.

3. Ambrosia Beetles of North America, l. c.

4. Bull. 31, W. Va. Agri. Expt. Sta., l. c.

of injured trees. Recently specimens were received from Dr. Fletcher with the following statement in the letter accompanying them :

"I now send you a few specimens and will ask you for a line or two on them. It is named *Xyleborus saxeseni* by European specialists, and is doing considerable harm to plum trees in England. Miss Ormerod showed me the work and gave me the specimen. I told her . . . I would submit it to you. . . . It was alive, with several others of different ages, in a large flat cavity in a plum branch two inches in diameter."

The evidence I have been able to obtain from a somewhat extensive study of the habits of this and other species of *Xyleborus*, leads me to conclude that while they must have moist wood in which to develop a brood and propagate the fungus upon which they feed, they all have a decided preference for that of dead, dying, or at least unhealthy trees, be they standing or felled, and in no instance have I found any species of the genus entering the wood of any part of an uninjured and healthy living tree. Even *X. dispar*, which has been recorded as infesting healthy wood of fruit trees in Europe and this country, has not been observed by me in healthy wood, although I have found examples of a species determined by Eichhoff as *X. dispar* in the wood of a great variety of trees in West Virginia'. *X. xylographus* comes nearer to attacking healthy wood of living trees than any other species I have observed. It will attack living trees, and has been frequently found in apparently healthy sapwood, but in such instances it had entered through the dead or dying wood of a wound or dead spot in the bark of the trunk or branches, as shown in Plate 3, fig. 1.

Even if it did attack perfectly healthy trees, it could scarcely be the primary cause of their death, unless the insects should occur in such vast numbers as to completely fill the sapwood with entrance galleries and brood-chambers, which in large trees is hardly possible, and in small trees not at all probable. In fact, they seem to prefer to excavate their brood-chambers in the heartwood, which, as is well known, is not a vital part of the plant structure. If the healthy living sapwood is penetrated at

1. This statement is not meant to even suggest the inaccuracy of the records of other writers, since I have reasons for doubting that the species I observed is a true *X. dispar*, and even if it is, habits of the same insect may differ under different environments.

all, it is usually by the primary or entrance galleries, which could cause only the slightest detriment to the vitality of the tree. The most vital part of a tree (the healthy living cambium) is seldom if ever touched by these insects, since they make their entrance through the dead bark or wood. If they did penetrate the healthy cambium, it would be no more than a pin-hole, which, even in great numbers, could scarcely do harm, since in healthy, growing trees such wounds would rapidly heal.

This and other insects with like habits may, however, hasten or even insure the death of unhealthy trees, since their entrance galleries may contribute to the attack of harmful micro-organisms (bacteria and fungi) which are ever ready to attack exposed plant tissue, and especially if the vitality of the growing parts becomes in the slightest degree impaired. This, it would seem, is the only way in which *X. xylographus* could affect the vitality of the trees infested by it, but to what extent it may do so is a problem for future investigation. It may, however, as suggested by Hubbard, be the cause of serious defects in lumber manufactured from trees or logs containing its pin-hole galleries and broad, leaf-like brood-chambers.

Preventives and Remedies.

From what is known of the habits of the insect, it would appear that the best methods of preventing its attack is to keep all fruit trees in nurseries and orchards in a vigorous, healthy condition, and during the winter, or previous to the first of April each year, destroy by fire all the unhealthy or dying or dead branches on trees, thus destroying the colonies before they emerge in the spring. Wounds or dead places on valuable trees may possibly be protected from the attack by the removal of the dead bark and painting the dead surface, especially the edges, with a strong solution of soap and water, undiluted kerosene emulsion, melted grafting wax, or like substances.

Different Stages Briefly Described.

(See Plate 2.)

Egg (fig. 1): Length, .52-.55 mm.; width, .24-.26 mm.; yellowish to pearly white; shining; ovate.

Larva, first stage (fig. 2.): Length, .60-.66 mm.; width, .20-.22 mm.; white; head broader than thoracic segments, and yellowish, with pale brown mandibles; body slender, narrowing to last abdominal segment; head and each segment clothed with long, fine white hairs, longest on the last three abdominal segments. Intermediate stage: Length, 1.5-1.8

mm.; width, .50-.55 mm.; yellowish-white; slender; thoracic and abdominal segments to seventh equal width (dorsal to ventral) and narrowing from seventh to last; hairs fewer and shorter than in first stage; head with brown, longitudinal line in front and short longitudinal groove above; mouth-parts darker. Matured larva (fig. 3.): Length, 2.8-3 mm.; width (lateral view) about .88 mm. at third thoracic segment and seventh abdominal, and .80 mm. at second to third, and narrowing from seventh to .30 mm. at last abdominal; colour, yellowish-white to yellow; head darker, with dark brown mandibles and brown longitudinal line, depression less than in intermediate stages; body stouter, thoracic segments much larger and head much smaller in proportion to body than in first and intermediate stages; segments and head sparsely clothed with short, fine hairs; mouth-parts as shown in fig. 8.

Pupa ♀ (fig. 4.): Length, 2.4-2.5 mm.; width (lateral) about .8 mm.; colour, yellowish-white to yellow; prothorax with dorsal posterior margin elevated, forming a conical hump; mesoscutellum prominently elevated and slightly bent forward; wing pads extended to posterior ventral margin of the fourth abdominal segment, the tips meeting or sometimes separated by a narrow space; antennæ prominent, tip of clubs extending beyond the middle of the front coxæ and to the base of the front tibia; hind tarsi with tips extending to tips of wing pads. The hairs, with which the front, the lateral and dorsal surface of the prothorax and dorsal surface of the abdominal segments are sparsely clothed, are fine and do not rise from tubercles.

Pupa ♂: Length, 2 mm.; width (lateral) .7 mm., easily distinguished from the female pupa by its smaller size and bent form; the abdomen is narrower and the tip bent down until it is even with the ventral edges of the wing pads; the hairs are fewer but stiffer and longer than on the female pupa.

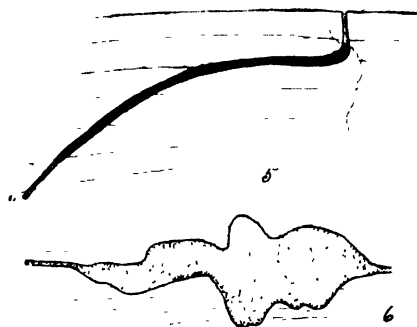
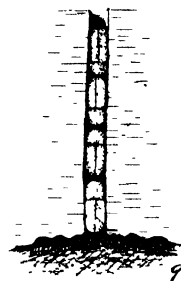
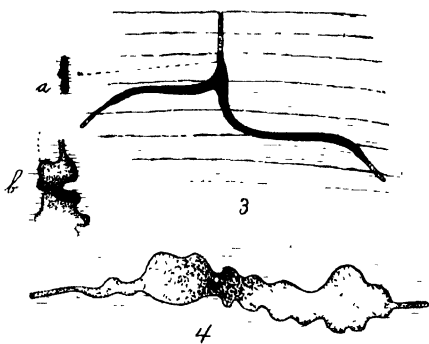
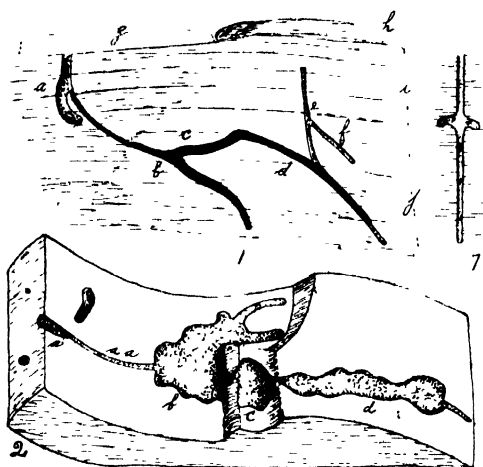
Imago ♀¹ (fig. 5): Length, 2.3-2.5 mm.; width (dorsal) .73-.74 mm.; colour varies from yellowish-brown to black; easily distinguished from all other known species of the genus by its size and the sculpture of the elytral declivity and the regular rows of small teeth on the first, third, fourth, and sometimes the fifth interspaces, as shown in fig. 7. There is considerable variation in colour and in the number and rows of teeth.

1. Female—*Bostrichus xylographus*, Say, 1826, 1 c.

“ *Bostrichus saxesevi*, Ratzburg, 1837, 1 c.

Tomicus dohrnii, Woll., 1854, Ins Mad., p. 290.

Xyleborus dryographus, Ferrari, 1867, Barkenk., p. 20.



H.S.H.

Imago ♂ (fig. 6): Length, 1.66–2 mm.; width (dorsal) .86–.88 mm.; easily distinguished by its general resemblance to the female, its small size, slightly flattened and bent form.

Galleries (Plate 3, fig. 1): Width of entrance on primary galleries, .8–.9 mm.; width of brood-chambers from 1 to 20 mm.; length, 1–7 mm.; diameter, .9–1.1 mm.

Explanation of Plates.

Plate 2.—1. Egg x 25 diameters. 2. Larva, 1st stage, x 25 diameters. 3. Matured larva x 12½ diameters. 4. Pupa x 12½. 5. Imago ♀ x 15. 6. ♂ x 15. 7. Elytral declivity x 25. 8. Mouth-parts of larvæ x 100. 9. Antenna x 100. 10. Labium x 100. 11. Maxilla x 100. 12. Front tibia x 100. 13. Tarsus x 100. 14. Genitalia x 50.

Plate 3.—1. Entrance gallery and brood-chambers in transverse section: a, gallery of *Stenoscelis brevis*, Bok, utilized by *X. xylographus*; b 1st, c second, d third, brood-chambers; e, incomplected exit gallery; f, branching gallery evidently for a fourth brood-chamber; g, dead and partly dried wood; h, living bark; i, living sapwood; j, heartwood; slightly curved transverse lines represent annual growths of wood.

2. Same as fig. 1 in vertical section, 2 b, 1st brood-chamber, showing death or garbage chamber at b b.; 3 and 4, transverse and vertical view of set of brood-chambers all in living and partly living wood; 5 and 6, entrance in dead wood, brood-chamber in living wood. 7, primary gallery with two egg chambers; 8, egg chamber enlarged; 9, female sentinels as found at aa, fig. 2; 10, ambrosia fungus. All original and from fresh or living material except 10, which is after Hubbard

2. Male—*Bostrichus saxosum*, Wiesm., 1846, Stett., Ent. Zeit., p. 24.
Bostrichus decolor, Boield, 1859, Ann. Soc. Ent. Fr., p. 479.
Xyleborus aescui, Ferrari (1867?), Barkenk., p. 22.
Xyleborus subdepressus, Rey, Rev. d'Entom. par. Fauv., 2, 142.
Xyleborus xylographus, Hopk., 1894, CAN. ENT., vol. XXVI, p. 279.

PANURGINUS CLYPEATUS.

In CANAD. ENTOM., 1897, p. 290, I referred the *Calliopsis clypeatus*, Cresson, to *Panurginus*. I had considered it probable that *Panurginus clypeatus*, Eversmann, 1852, was really a *Panurginus*, but was not sufficiently sure to venture upon changing the name of our insect. There has just come to hand, however, an excellent little monograph of the palæarctic species of *Panurginus*, by Mr. H. Friese, and on p. 19 the Eversmann species is definitely referred to that genus. *P. clypeatus* (Cress.) may therefore be called *P. cressoniellus*, n. n.

Mesilla Park, N. M., Jan. 11, 1898.

T. D. A. COCKERELL.

FOUR NEW SPECIES OF PHLEPSIUS.

BY CARL F. BAKER, AUBURN, ALA.

Phlepsius arcolatus, n. sp.

♀.—Length 6.5 mm. Form of *cinereus*: Head narrower than pronotum. Vertex distinctly angulate, a little longer than half width between eyes or half the length of pronotum; nearly flat, slightly broadly depressed on either side, the edge distinctly compressed. Front a half longer than wide, nearly two and a half times the length of the clypeus, sides rather strongly incurved at antennal sockets. Clypeus gradually enlarged towards the truncate tip, its length once and a half the width at tip. Width of pronotum nearly two and a half times the length, surface neither punctured or wrinkled.

Colour cinereous. Vertex with two large fulvous clouds, a triangular black spot either side of tip, and two black dots at base. Ocelli large, white. Clypeus with two black dots near tip, loræ and genæ irregularly dotted, and front with poorly-defined arcs. Pronotum anteriorly with four indistinct fulvous blotches, posteriorly and scutellum irrorate with fulvous. Elytra milky white, veins dark brown, the supernumerary veins distinct and numerous; the other dark colouring bordering the cells, but usually not touching the veins, producing a strongly areolate appearance; with darker costal dots. Legs with the following more conspicuous markings: Fore femora with a black spot before near the apex, fore tibiae with three black spots before; behind both are heavily irrorate with black; middle femora with a longitudinal black stripe behind, middle tibiae trimaculate; hind femora and tibiae with a longitudinal stripe before. Sternum with three dark spots on either side. Venter, except along the middle and dorsum, irrorate with dark.

Last ventral segment twice the length of preceding, hind margin truncate, with a small median notch; lateral angles rather sharp.

The type specimen of this interesting species was collected at Onaga, Kansas, by Mr. F. F. Crevecoeur. It is very distinct from anything in the *spatulatus* group.

Phlepsius personatus, n. sp.

♀.—Length 6 mm. Form very closely resembling that of *spatulatus*, but smaller. Head narrower than pronotum. Vertex very obtusely angulate, length three-fifths of width between eyes, or somewhat over half the length of the pronotum; surface gently convex, evenly rounded on to the front, entirely without a compressed edge. Front nearly a half longer

than wide, two and one-half times the length of the clypeus, sides gently incurved at the antennal sockets. Clypeus gradually enlarged towards the truncate tip, basal suture obsolete. Width of pronotum scarcely two and one-fourth times the length, surface sparsely punctured.

Colour pale cinereous. Head washed with fulvous, with few dark marks, but the arcs on front distinct: antennal pits, eyes, and a narrow longitudinal area on the pleura back of eyes, dark brown, giving the insect a very unique appearance. Pronotum obscurely irrorate with fulvous. Basal angles of scutel broadly fulvous. Elytra milky white, vermiculations very fine, faint, and evenly distributed: without supernumerary transverse veins; legs without marks, except the usual dots at bases of spines.

Last ventral segment twice the length of preceding, hind margin truncate, with a small median notch: lateral angles very obtuse.

Described from a single specimen collected at Yuma, Ariz., July 6th, 1897, by Prof A. P. Morse. This species resembles a small *spatulatus*, which is its nearest relative, but differs in size, colour and genital characters.

Phlepsius texanus, n. sp.

♀.—Length 7.5 mm. Form nearest to that of *punctiscriptus*, which it also resembles in some other characters. Head slightly broader than pronotum. Vertex little produced, very obtusely angulate, length one-third of the width between the eyes, or somewhat more than one-third the length of the pronotum: surface sloping, slightly transversely depressed, meeting the front in a very obtuse angle, edge not at all compressed. Front a third longer than wide, sides evenly curved from the vertex to the clypeus, not at all bent opposite the antennæ. Clypeus slightly enlarged towards the truncate tip, length once and three-fourths the width at tip. Width of pronotum once and seven-eighths the length, surface obscurely punctured.

Colour cinereous, with a faint fulvous tinge on vertex, pronotum, and scutel. Vertex irrorate with brown, face dark fulvous, except numerous small round light dots all over, and several larger light spots on front: the ocelli in white dots. Pronotum coarsely irrorate with brown, more strongly so in an irregular band between the hind angles of the eyes. Scutel with two black dots on each lateral margin. Elytra milky, and, except in frequent small irregular areas, marked with fine dots and very fine vermiculations, the latter short, rather few in number and radiating from

the veins, without supernumerary transverse veins. Commissural and apical costal margins each with two larger dark spots. Femora more or less completely heavily triannulate with dark, the fore and middle tibiae more or less completely quadriannulate; hind tibiae with large dots at bases of spines and tip, black.

Last ventral segment once and a half times as long as preceding, hind margin black and slightly sinuate, hind angles narrowly, somewhat acutely, produced nearly a third the length of the segment.

♂ more slender. Length 7 mm. Plate short, broadly triangular. Valves short, each about as broad as long, outer edge obtusely angled below, tips bluntly rounded, far exceeding the extremely short pygofer.

Described from several specimens in the National Museum collection, from Texas. This species is very distinct from any described North American form. It resembles *punctiscriptus* somewhat, but differs in structure of head, genitalia of both ♀ and ♂, and in markings.

Phlepsius Rileyi, n. sp.

♀.—Length 7.5 mm. Nearest *texanus*. Head slightly broader than pronotum. Vertex rather strongly angularly produced, length little less than one half of the width between the eyes, or about one-half the length of the pronotum; surface sloping, slightly transversely depressed, meeting the front in a very obtuse angle, edge not at all compressed. Front somewhat less than a third longer than wide, sides evenly curved from vertex to clypeus, not at all bent opposite the antennae. Clypeus slightly enlarged towards the truncate tip; length once and three-fourths the width at tip. Width of pronotum nearly twice the length; surface sparsely punctured.

Colour pale fulvous. Markings as in *texanus*, except paler and more uniform on vertex, and no indications of a band on the pronotum; the whole insect of a more distinctly fulvous cast.

Last ventral segment twice the length of the preceding, entire hind margin in two large evenly rounded lobes, the notch between them V-shaped.

Described from material in the National Museum, collected in Texas. This species has no relative nearer than the *texanus*, from which it differs in proportions of head and pronotum and in the genitalia. The genitalia of the female resemble somewhat those of *incisus*, but that species differs widely in form and coloration. Named after Dr. Riley, in whose collection it first occurred.

NOTES ON COLLECTING "AT LIGHT."

BY A. W. HANHAM, WINNIPEG, MAN.

Until last year (1897), owing to the lack of suitable surroundings, I had made no attempt at systematic collecting "at light." Now, as the result of this one season's capture, I am firmly convinced that this method of collecting is the very best way in which to make a large collection quickly and to secure in abundance species hitherto rarely met with or entirely new. For all night-flying species no other way of collecting has ever proved so profitable with me, and a short account of my experiences, with notes of some of the captures made, may be of interest. To begin with, this was my fourth collecting season in Manitoba, but until this year the good things taken at light were few and far between. Locality is everything, and my surroundings in previous years consisted of too much brick and mortar and too little of nature's clothing. At the end of May this year I moved to Fort Rouge, a suburb of Winnipeg, situated between the Red and Assiniboine Rivers. Formerly the whole of this was "bush," with some good timber along the river banks. I am glad to say that a goodly portion of Fort Rouge is still "bush," with here and there a little clearing, sufficient to allow of a residence or so: sometimes just enough only for the house, which when the trees are in full foliage may be completely shut in. Where I live the place is more settled, but still plenty of thick bush about, here and there, if only in small pieces. In June my yard (out of politeness perhaps it should be styled garden) was full of wild rose bushes, the flowers of which adorned our tables and perfumed our rooms for more than a month. The children stepped outside the back gate to pick flowers and wild strawberries: at the side of the house and along the roadway in front on both sides, white clover was everywhere in profusion, and the air was laden with the scent. And yet the road is block-paved, and the electric cars pass along it, and a ride of eight minutes on my wheel will take me to my office in the heart of this city of 40,000 or more people.

I may say here that all my collecting "at light" was done from an upstairs window—that of my sanctum—facing nearly west; at one side of the window is a small poplar, and on the other, further away, close to the house is a good-sized oak tree, denuded of most of its boughs, and a few other small trees. What will some day (all too soon) be a road along the side of the house is still covered with bushes, with here and there a tree. To the right looking out of the window are three arc lights, all within

about 100 yards of the house, the nearest perhaps not more than 50 yards from the front door. What effect these lights had on my collecting is entirely conjectural; sometimes I have been inclined to think that it was owing to the quantity of things drawn to the neighbourhood by them that I did so well; at others, that owing to their superior brilliancy or attractiveness I got but a small share of the things that were flying, in which case the quantity of insects around these electric lights some nights must have been enormous. I must confess that sometimes a wish entered my mind that these lights would go out, so that my small one might have no opposition.

Enough of the surroundings, now for the experiences or results.

My first venture was made on the evening of the 27th of June, and with the exception of a few nights when the moon shone too brightly, I tried light nearly every evening, for a longer or shorter time, according to "the profits," until I went to Brandon, Man., on the 5th of August. On my return at the end of that month I resumed collecting in this way until well on in September, but the weather was very unfavourable and I took little, as compared with the July catches; the nights were either too light outside or too windy, and during the whole month no rain fell, so that the conditions can hardly be said to have been suitable, not affording a fair test. Though I am well satisfied with the gifts showered upon me, it is still a matter of regret that I did not commence a month earlier in the season and that I lost nearly the whole of August as well, for I have no doubt that I missed many a good thing not yet represented in my collection.

It was owing to my inability to get out for any day or evening collecting during June (due to pressure of business and domestic disarrangements) that I bethought me of collecting "at light"; had it been otherwise, I dare say my light collecting would never have seen a beginning, nor a continuation, had not I met with such unexpected, surprising and encouraging success at the outset.

The very first captures at light on June 27th were *Leucania albilinea*, and *Plusia Putnami* and *striatella*; these were followed after an interval by *Plusia insolita* and *ampla*; the Sphingidæ were represented by *Smerinthus geminatus* and *Paonias excæcatus*; the Bombycidæ, by *Cerura occidentalis*, *Tortricidia testacea*, several species of *Schizura*, *Edema albifrons*, *Nadata gibbosa*, *Notodonta elegans*, *Pheosia dimidiata*, *Crocata immaculata* by the dozen, etc.; the Noctuidæ, besides those already men-

tioned, included such nice things as *Pseudothyatira cymatophoroides*. *Charadra deridens* (1), *Diphthera fallax* (1), *Raphia frater*, in plenty, several species of *Acronycta*, *Microcœlia*, *Rhynchagrotis*, and a fair proportion of common things: the *Geometridæ* were also well represented, such hitherto rare species (with me) as *Metanema inatomaria* and *Phasiane mellistrigata* being among the commonest, while several large, handsome species put in an appearance; these are new to my local list and still await identification. The "Micros" were almost without number, and selection was a difficult matter. My diary records that the evening was warm and moist, and that it was 3.30 a. m. before I sought my couch.

June 28th was another good evening, while it lasted, but I retired at a much earlier hour.

June 30th: I have called this a beetle evening in my diary, nothing else coming in until quite late. *Agonoderus pallipes* was a nuisance, as were also several species of small water beetles; among the good things were some species of *Lebia*, a new "Longhorn," weevils, etc.

July 1st was another capital evening, my notes say; three species of *Sphingidæ* new to the district—one of these was *Sphinx albescens*; more new *Bombycidæ*, including *Phyllodesma americana*, etc.

July 2nd: On this evening the *Sphingidæ* stayed at home, or at any rate remained outside, but their place was well filled by more *Plusia striatella* (5) and *ampla* (2); also another *insolita*: *Putnami* and *æreoides* were plentiful; *Abrostola urentis* and *Deva purpurigera* also made their first call; *Metathorasa monetifera* was more timid, only one putting in an appearance, and this species did not occur again. Two species of *Caradrina* were taken, *miranda* and *punctivena*—the latter being quite abundant—also *Noctua Treatii* (3); *Pyrrhia exprimens*, *Leucania commoides* and *Cucullia florea* were well represented. *Carneades divergens* and *Mamestra lorea* came in in such numbers as to be almost a nuisance. The *Bombycidæ* included a single *Halisidota maculata* and *Argryrophyes cilicoides*; the latter species I understand is quite a rarity.

July 3rd: *Arctia virgo* and *Dryopteris rosea* came in first on this date. On the 5th my diary records the running out of pins and the making of new setting-boards, as one result of the quantity of "stuff" taken.

July 6th: A *Dryopteris irrorata* gladdened my eyes on this evening. (The second one of these caught came in on the 8th.)

July 7th: *Pallachira bivittata*, a handsome and very rare "snout" moth, appeared on the scene. I got two; during the next few evenings I took more of them; in all, six being secured.

July 8th: The most noticeable things were *Ceratonia undulosa* and several large species of *Acronycta* and *Mamestra*.

July 9th: The first species of *Ichthyura*, namely, *albosigma*, was captured on this evening.

The next few evenings were too light outside and I got little, but I mention the capture on the 10th of *Crambidia pallida*; this species became fairly common later on in the month.

July 15th: This evening I took four fresh *Plusia bimaculata* and some *striatella*, several *Mamestra assimilis* and *Hadena impulsiva*, a fine *Cerura occidentalis*, *Clisiocampa fragilis*, more *Dryopteris rosea*, and another pair of the tiny white Bombycid, *Argyrophytes cilicoides*, etc.

July 18th: Another *Cerura*, *Arctia Saundersii*, *Carneades flavicollis* and *silens*, and *Orthosia Conradi* (?) were among my visitors this evening.

July 19th: This was my record evening of the season, and one in another way as well, it being 4 o'clock when I put out my light and retired for the night (?). It was another wet night, and stormy at intervals. I was first of all deluged with mosquitoes, and a small green tree-hopper; these were soon joined by swarms of *Crambidae*, among which *Crambus unistriatellus* was the most conspicuous. The larger moths included a dozen or more of the two species of *Arctia* already recorded, half a dozen *Parorgyia plagiata*, three species of *Ichthyura*, *Cerura cinerea* (the only example taken), more of the little white Bombycid, several species of *Schizura* and *Ianassa lignicolor*; the three specimens of the moth last named appeared on the scene almost at the same moment. Some of the common Noctuids, such as *Feltia jaculifera*, *Noctua fennica* and *haruspica*, *Hadena lignicolor*, *Mamestra lilacina*, *Hydræcia nictitans*, and others, were becoming troublesome. This was a great evening for Noctuids; some of the particularly showy species were *Hadena adjuncta* and *miseloides*, *Trachea delicata*, *Mamestra lubens*, *Plusia striatella*, *bimaculata* and *viridisignata* (1), the last *Plusia* being an addition to my local list. I also took one *Acronycta hamamelis*, and *impressa* was quite plentiful. *Senta defecta* turned up for the first time, and in extraordinary abundance; I could easily have bottled 100 of them; a *Tineiid*, somewhat smaller, but mimicking this species in colour and markings, was nearly equally common. In Geometers, I got six or more *Plagodis rosaria*—previously represented in my collection by a single specimen, taken at Brandon in 1896—and several large green Geometers, for which I have not yet succeeded in getting a name; and there were many other species.

[TO BE CONTINUED.]

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXVIII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.

LIOPUS, Serv.

Resembles the preceding genus in form, but the angulation or tuberculation of the prothoracic flanks is better marked. The Canadian species are few. Mr. Leng has thus defined them, following, in the main, a previous arrangement of Dr. Horn :

- A. Front flat, mouth in same plane. Elytra without angular mark posteriorly, sides of thorax arcuate, the spine small and acute. Elytra without erect scales. .24-.48 in *variegatus*, Hald.
- AA. Front convex, mouth slightly retracted ; lateral spine of prothorax rather distant from base. Elytra without distinct tufts of erect scales.
 - b. Elytra with an acutely angular band behind the middle, which is, however, sometimes wanting.
 - Surface finely punctured, almost impunctured behind the band. .16-.28 in *alpha*, Say.
 - Surface more coarsely punctured, very distinctly so behind the band. .16-.28 in *cinereus*, Lec.
 - bb. Elytra with a feebly marked post-median band of whitish pubescence in place of the angulate line. .20-.25 in *punctatus*, Hald.

Liopus alpha and *cinereus* are united by Mr. Leng under the former name, the differences given above becoming evanescent in long series. *L. variegatus* is said to breed in box elder, *L. alpha* in apple, and *L. cinereus* in hickory and locust.*

LEPTURGES, Bates.

In this genus the spine of the prothorax is quite near the base. The following table has the same origin as the preceding :

- A. Lateral spine of prothorax rather broad, very close to the base. Colour usually pale with short gray pubescence, black markings as follows: Four spots on the thorax, two on each elytron near the base and close to the suture, a lateral stripe before the middle connected with a broad irregular transverse band, and three (often

*In the table of genera the genus *Leptostylus* is said to have the prothorax "fully tuberculate." It should read "feebly tuberculate."

united) spots near apex arranged in the arc of a circle. These markings may vary in either direction, so that specimens may be nearly black or almost entirely pale. .28-.36 in. *symmetricus*, Hald.

AA. Lateral spine more slender, less close to base, tip recurved. Elytra fasciate with black.

b. Post-median fascia incomplete, broadly interrupted at suture.

.24-.36 in. *signatus*, Lec.

bb. Post-median fascia entire, not interrupted, broad.

Fasciæ oblique on each elytron, apex not black. .18-.24 in. *querci*, Fitch.

Fasciæ transverse, apex also black. .12-.16 in. *facetus*, Say.

A few notes have been published on food habits: *L. signatus* has been found on dead sumach twigs, *L. querci* on oak, butternut and hickory, *L. facetus* on juniper. The last has also been bred from beech and hickory.

HYPERPLATYS, Hald.

H. aspersus, Say. and *H. maculatus*, Hald., occur in Canada, according to the Society List. They are considered by Mr. Leng as races of one species, which should be called by the former name. The ground colour appears to be of a brownish or bluish-gray, the upper surface maculate with numerous small roundish black spots. For convenience the characters on which the names are based are copied from Dr. Horn.

Elytra twice as long as wide at base. Antennæ in both sexes at least twice as long as the body *aspersus*, Say.

Elytra broader, not twice as long as wide. Antennæ not reaching twice the length of the body in either sex *maculatus*, Hald.

Length, .14-.26 inch. Breeds in poplars and apple twigs.

ACANTHOCINUS, Steph.

Only one species occurs with us, *A. obsoletus*, Oliv., found about pine lumber. It is a grayish beetle, .40-.60 in. long, the elytra coarsely, not closely, punctured, with a rather indistinct raised line (costa) on each. The ornamentation consists of a number of small dark blotches and three undulated elytral bands, which are often more or less broken up. The resemblance to some beetles of neighbouring genera is quite close, so that careful reference should be made to the characters given in the preceding table,

GRAPHISURUS, Lacordaire.

The Canadian records include *G. fasciatus*, DeG., and *G. triangulifer*, Hald., but it is quite likely that the latter reference is incorrect, the species being more essentially southern, and occurring from Missouri and Ohio to the Gulf States.

Stouter, pubescence of upper surface mostly ochreous. Prothorax pale at sides, this pale area enclosing a few small black spots; median stripe broad, dark, and in turn enclosing three (2 sub-apical, 1 sub-basal) ochreous spots. Elytra with ochreous pubescence marked by many very small black spots, especially towards the sides, scutellar area black, as is also a sub-humeral blotch, a large many-angled, intensely black post-median blotch, not extending quite to the suture, and a sub-apical angulate mark. Tarsi equal in width in both sexes. .52-.54 in. *triangulifer*, Hald.

More elongate, pubescence of upper surface chiefly grayish, except for dark markings, which consist of small, closely-placed spots and blotches. These form a tolerably distinct line on each side of the middle of the prothorax, and usually also an ante-median and post-median irregular elytral fascia. Anterior and middle tarsi of male broader than in female. .32-.56 in. (Fig.

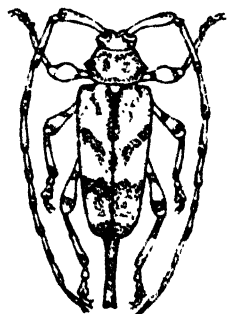


FIG. 4.

3.) *fasciatus*, DeG.

G. fasciatus is common in the lake regions, and is said to breed in oak and maple. *G. triangulifer* was found in the larval state boring under bark of injured hackberry trees (*Celtis texana*) by Mr. Schwarz.

CERATOGRAPHIS, Gahan.

Here belongs *C. biguttata* (*Liopus biguttatus*, Lec.), which is unknown to me. Aside from the generic characters, it is stated to be "elongate, scarcely depressed, testaceous, pubescence brownish. Elytra indistinctly mottled, each with an oblique black band behind the middle." Length, .36 in.

DORCASHEMA, Lec.

Represented in Canada by *D. nigrum*, Say, which has been bred from hickory limbs. It is easily recognized by the long antennae, entirely black colour and cylindrical form, the prothorax tubularly narrowed behind the middle, and with rugose disk. The elytral punctures are clear

and deep, not very large nor crowded. Under surface clothed with pale pubescence, which gives a leaden effect. Length, .32-.40 in.

ONCIDERES, Serv.

The "hickory girdler," *O. cingulatus*, Say (fig. 4), is the only Canadian species. It is variable in colour, but the northern forms will approximate the following description: Brownish or reddish yellow, prothoracic spine blunt or wanting; elytra with a broad transverse band of (usually) cinereous pubescence and with scattered yellow spots, these latter sometimes forming tolerably regular rows. Length, .56-.68 in. Dr. Hamilton says that it occasionally girdles pear, apple, plum, linden, elm, and various other trees.

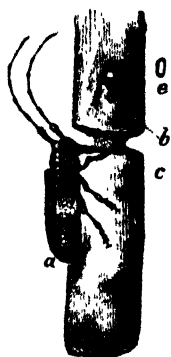


FIG. 4.

AMPHIONYCHA, Lec.

A. flammata, Newm., is .24-.38 in. long, black, clothed with erect dark hairs, the head with two yellow spots or stripes; the sides of the thorax are broadly, those of the elytra (usually nearly to tip) narrowly, yellow. The elytral punctuation is very close and coarse. Antennæ clothed with long hairs. Care should be taken not to mix this species with *Eupogonius subarmatus*, which it very closely resembles.

SAPERDA, Fabr.

All of the North American species have been found in Canada, so we reproduce entire the table given by Dr. Hamilton in Trans. Am. Ent. Soc., XXIII. The larvæ of all mine in living trees, hence they are extremely destructive.

- A. Elytra separately acuminate at tip. Colour yellowish-brown, with oblique darker bands. .64-.76 in. *obliqua*, Say.
- AA. Elytra rounded at tip, with an acute sutural spine. Pubescence cinereous, variegated with fulvous (or nearly uniform brownish-yellow in the var. *adpersa*, Lec.), shot with numerous black denuded points, thorax vittate. 1.00-1.25 in. *calcarata*, Say.
- AAA. Elytra obliquely narrowed and prolonged at tip, slightly dehiscent, coarsely punctate. Pubescence thin, cinereous, variegated with fulvous patches. Thorax trilineate with fulvous. Antennæ conspicuously annulated with white. .36-.60 in. *mutica*, Say.

AAAA. Elytra rounded at tip.

b. Elytra vittate or with lateral stripes.



FIG. 5.

Pubescence silvery white; thorax and elytra with three broad pubescent brown vittæ. .60-.80 in. (Fig. 5.) *candida*, Fabr.

Pubescence cinereous; head and thorax with bright yellow pubescence, six black denuded spots on thorax. Elytra with broad marginal and sutural stripe bright yellow. .37-.40 in. *puncticollis*, Say.

Pubescence grayish. Elytra with broad submarginal stripe, and sometimes also the suture narrowly yellowish-scarlet. A broad stripe on each side of thorax. Surface colour piceous, punctures coarse. .36-.60 in. *lateralis*, Fabr.

Pubescence grayish. Elytra with broad submarginal stripe (extending also along sides of thorax) yellowish-scarlet, connected with which are three oblique bands, which may reach the suture or be reduced to mere short projections, surface colour piceous, punctuation finer. .36-.52 . *tridentata*, Oliv.

bb. Elytra with white pubescent spots. Surface brown.

Thorax with two white stripes, besides a narrow discal white line. Elytra each with two large white spots, sides of under surface white. .40-.80 in. *cretata*, Newm.

Thorax with two white stripes, no discal line. Elytra each with a humeral and two subsutural white spots, sometimes becoming obsolete in the male. Under side altogether or with sides white. .40-.48 in. *fayi*, Bland.

bbb. Elytra each with three small denuded spots, sometimes wanting. Pubescence dense, uniformly olivaceous or yellowish-brown. .48-.76 in. *vestita*, Say.

bbbb. Elytra with a transverse undulate fascia; surface colour piceous to ferruginous, punctuation coarse and deep. .60 in. *discoidea* (♀), Fabr.

bbbbb. Elytra unicolorous, not variegated.

Thorax with a broad denuded stripe each side of the median line. Piceous to ferruginous, under side with dense grayish-white pubescence. .40 in. *discoidea* (♂), Fabr.

Thorax with a denser line of gray pubescence each side, black, coarsely punctured, pubescence thin, grayish or (in Pacific Coast specimens) fulvous. .32-.36 in. *mæsta*, Lec.
 Thoracic pubescence uniform. Black, densely clothed throughout with cinereous pubescence, less coarsely punctured. .44-.48 in. *concolor*, Lec.

Some of the recorded food plants of the species of *Saperda* are as follows: *S. obliqua* has been found in the adult state on black alder; *S. calcarata* breeds in various poplars and in basswood; *S. candida* in apple, crab apple, mountain ash, junberry and hawthorn; *S. puncticollis* in poison ivy; *S. lateralis* in hickory, elm and witch-hazel; *S. tridentata* chiefly in elm, also in maple; *S. crenata* and *S. fayi* in thorn (*Crataegus*); *S. vestita* in basswood; *S. discoidea* in hickory and butternut; *S. mæsta* in poplars; and *S. concolor* in poplars and willows.

EUPOGONIUS, Lec.

Three species are known from Canada. They may be known thus:

- A. Elytra black, punctuation coarse quite to apex. Thorax black, with a broad line of yellow pubescence near each lateral margin. .28-.32 in. *subarmatus*, Lec.
- AA. Elytra piceous or castaneous, punctuation finer or even obliterated towards apex; Elytra castaneous, punctuation finer, almost obliterated at tip; pubescence grayish or yellowish, forming reticulations. .28-.32 in. *tomentosus*, Hald.
 Elytra piceous, punctuation stronger, pubescence luteous, forming small mottlings or patches. .24-.36 in. *vestitus*, Say.

Of these, *E. subarmatus* bores in elm, *E. tomentosus* in pine and hickory, *E. vestitus* in hickory.

HOPLOSIA, Muls.

Represented by *H. nubila*, Lec., which is described by the author as being .35 in. long, blackish piceous, polished, irregularly clothed with short, dense cinereous pubescence, thorax with acute lateral spine, elytra with large, closely placed punctures anteriorly, tip rounded. It lives on basswood.

POGONOCHERUS, Latr.

Two small blackish species belong here. They are variegated with whitish or grayish pubescence, and the elytra are truncate, more or less dentate at tip. *P. penicillatus*, Lec., is .24 in. long, blackish; elytra with

sub-basal band of grayish pubescence, well marked lateral costæ, and with a row of five or six tufts of erect black setæ. *P. mixtus*, Hald., is .20-.28 in. long, much resembling the former species, but the lateral costæ of the elytra are indistinct and the tufts wanting. The extent of the pubescent bands is variable. The elytra are clothed with erect black bristles, in addition to the short pubescence. Bred from dead willow branches, and found also on pear trees, while I have taken it quite abundantly on poplar logs.

ECYRUS, Lec.

E. dasycerus, Say, has been bred from dead hickory limbs by Dr. Hamilton. It is from .24-.32 inch long, brownish or cinereous, thorax without well-marked tubercles, disk with two longitudinal approximate dark lines, usually rather indistinct. Elytra with black arcuate band near base, a number of black points (consisting of bundles of hairs) arranged in series, and a common indistinct white band behind the middle, which may sometimes be wanting. The antennæ are hairy beneath.

OBEEA, Mulsant.

Contains very elongate, cylindrical species, easily recognized by their facies. Some of them are quite variable in colour, and hence the number of names proposed is in considerable excess of the species now recognized. Mr. Leng has tabulated them according to structural characters, leaving only three specific names to cover all the recorded Canadian forms, thus :

Thorax with four callosities; pygidium of female strongly protuberant. .45-.60 in *Schaumii*, Led.

Thorax with two callosities; pygidium of female feebly protuberant. .32-.70 in *tripunctata*, Swed.

Thorax without callosities; elytra densely pubescent. .60-.70 in *ruficollis*, Fabr.

The colour varieties of *tripunctata* are thus separated by Mr. Leng; *amabilis* is said to scarcely differ from *mandarina* :

Body beneath black; legs nearly or quite black.

Thorax yellow, with two discal and an antescutellar spot black *tripunctata*, || Fabr.

Thorax yellow, with two discal spots alone black. *bimaculata*, Oliv.

Body beneath in great part yellow; head yellow, thorax with two discal and an antescutellar spot black. *mandarina*, Fabr.

Most of the species of *Obeea* are found about raspberry and blackberry, in the canes of which they bore. However, *O. Schaumii* and *O. mandarina* breed in twigs of cottonwood.

TETRAOPES, Serv.

Moderate sized, stout insects, with short antennæ and strongly tuberculate thorax. They are found on *Asclepias*, the common milkweed, in the stems and roots of which they are said to breed. The two Canadian species may be known thus :

Smaller (.32-.48 in.); body beneath, legs and antennæ, black.

Above red; scutellum, four spots on the thorax and elytral markings (a spot on the umbone, a large median heart-shaped blotch and broad common apical space), black. These markings are liable to some variation through extension or diminution *canteriator*, Drap.

Larger (.36-.56 in.); ground colours and thoracic ornamentation about as in the preceding species, the front angles and basal margin sometimes also dark. Elytra with umbonal, two ante-median (one subsutural, one discal) and one post-median spot on each, black. *tetraophthalmus*, Forst.

The bibliography of the North American Cerambycidae is very extensive. Aside from detached descriptions of species and biological notes, the following papers, which are more or less synoptic or monographic in form, are recommended for consultation :

1847. Haldeman, S. S. Materials towards a history of the Coleoptera Longicornia of the United States. Trans. Am. Phil. Soc. Additions and corrections to same, Proc. Am. Phil. Soc., Vol. IV.

1850-1852. Leconte, J. L. An attempt to classify the Longicorn Coleoptera of America north of Mexico. Jour. Acad. Nat. Sci., Phila.

1873. Leconte, J. L. New species of North American Coleoptera, Part II., Smithsonian Institution. Contains tables of several genera.

1878. Horn, Geo. H. Notes on some genera of Cerambycidae of the United States. Tr. Am. Ento. Soc.

1880. Horn, Geo. H. Notes on some genera of Cerambycidae, with descriptions of new species. Tr. Am. Ento. Soc.

1885. Horn, Geo. H. Descriptions of some new Cerambycidae, with notes. Tr. Am. Ento. Soc.

1884-1890. Leng, C. W. Synopses of Cerambycidae. Begun in Bulletin Brooklyn Ento. Soc., Vol. VII., continued in Entomologica Americana, Vols. I.-VI. Contains tables of all genera up to and including the Lepturoidea. The remainder are treated in a paper, cited below, by the same author in collaboration with Dr. Hamilton.

1890. Casey, Thos. L. Coleopterological Notices, II. Ann. N. Y. Acad. of Science. Tables of *Ergates* and *Tragosoma*.

1891 Casey, Thos. L. Coleopterological Notices, III. Ann. N. Y. Acad. of Sci. Contains synopses of several of the smaller genera.

1893. Casey, Thos. L. Coleopterological Notices, V. Ann. N. Y. Acad. Sci. Tables of four genera.

1896. Leng, C. W., and Hamilton, John, The Lamiinae of North America. Trans. Am. Ento. Soc.

THE MONTREAL BRANCH.

The 211th regular monthly meeting of the Montreal Branch of the Entomological Society of Ontario was held on 11th January, at 74 Mc-Tavish street; Mr. Henry H. Lyman, president, in the chair. Dr. James Fletcher, F. L. S., F. R. S. C., the Government Entomologist, had come down from Ottawa to attend the meeting, and gave a full and most interesting account of the San José scale, the insect pest which is so destructive to the fruit-growing industry, and the introduction of which into Canada from infected nurseries in the United States has caused such widespread alarm. Dr. Fletcher gave an account of its life history, described the features which distinguish it from other and comparatively harmless scale insects, and the most approved remedies for controlling and, if possible, exterminating it. A hearty vote of thanks to Dr. Fletcher was unanimously passed. The President read a letter from Mr. John G. Jack, now of the Arnold Arboretum of Harvard University, who still keeps up his membership in the Branch, announcing the donation of three valuable United States Government reports to the library of the Branch. A cordial vote of thanks to Mr. Jack was unanimously adopted. The President read a paper entitled "Further Notes on the Genus *Chionobas*," illustrated with specimens of nearly all the known species and varieties from this continent, as well as some from the Old World. After discussion and the examination of many interesting specimens, among them some brought back by the Hudson's Bay expedition from the far north, the meeting adjourned.

NEWS OF THE DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

The collection of insects of the U. S. National Museum at Washington is rapidly increasing. A great donation, the details of which have just been completed, is the large Hubbard and Schwarz collection of Coleoptera. This is one of the first collections of Coleoptera in the United States. It comprises from 10,000 to 12,000 species brought together by Messrs. Hubbard and Schwarz during the last twenty-five years. It has especial value from its fine condition and accurate labelling, affording possibly the best source of information regarding geographical distribution. This collection adds about 3,000 species to the collection of Coleoptera of the Museum. It contains a moderate number of types, but a large number of co-types of the species described by Leconte and Horn. It also contains some exotics, notably a good collec-

tion of West Indian micro-Coleoptera, and is practically unique in its large series of coleopterous larvæ and pupæ in alcohol.

The death of Mr. M. L. Linell, in the spring of 1897, was a severe blow to the Department, but a rearrangement has been effected by which an excellent working force has been secured. The Department has been extremely fortunate in attaching to it Dr. Harrison G. Dyar. Since the departure of Dr. John B. Smith there has practically been no Lepidopterist in Washington, and Dr. Dyar's advent is especially welcome. He has entirely rearranged the collection of Lepidoptera, and has deposited in the Museum his own large collection of some 15,000 specimens. The force as at present constituted is: L. O. Howard, Honorary Curator; Wm. H. Ashmead, Assistant Curator and Custodian of Hymenoptera; Harrison G. Dyar, Custodian of Lepidoptera; E. A. Schwarz, Custodian of Coleoptera; D. W. Coquillett, Custodian of Diptera; and R. R. Currie, Aid.

For a department which has bought no large collections, the Department of Insects is rich in type material. The catalogue shows the existence of over 4,000 types in the different orders.

Recent accessions of special value are a collection of European bees, representing all of the genera known except one: the Hubbard material in all orders recently collected in Arizona; the African material collected in Liberia by Cook and Currie; the African and Siamese material collected by Dr. W. L. Abbott; a collection of Coccinellidæ and Psyllidæ made by Albert Koebele in Japan, Australia, China, and Mexico; a collection of parasitic Hymenoptera made by the same collector in the countries above indicated; a very large collection of Japanese insects in all orders presented by the Imperial University of Tokio through Professor Mitsukuri; the T. A. Williams collection of Aphididæ, comprising over 800 slides of forms collected in the Northwest. Smaller donations are constantly being received from collectors and specialists and the number of those received in the course of the year form very important additions to the collection.

The facilities for the preservation of specimens have been very considerably increased, several hundred of the permanent glass-covered drawers having been added.

It is with profound regret that we record the death of DR. GEORGE H. HORN, the eminent Coleopterist, which took place at Beesley's Point, N. J., on the 24th of November last. He was President of the American Entomological Society and Director of the Entomological Section of the Academy of National Sciences of Philadelphia, and one of the few honorary members of the Entomological Society of Ontario.

AN ANTS'-NEST COCCID FROM NEW MEXICO.

BY J. D. TINSLEY, MESILLA PARK, N. M.

Phenacoccus solenopsis, n. sp.

Adult ♀.—Length, 5 mm.; width, 3 mm.; many are smaller than this, but this seems to be the average size of the adult containing eggs. Colour yellowish-gray, although they appear light gray, from the mealy secretion which covers the body.

Shape, ellipsoidal, dorsal surface quite convex, ventral surface flat, extremities rather pointed. Segmentation quite distinct to naked eye. Extremely short lateral appendages, little projections just visible; caudal appendages a little longer.

Legs and antennæ pale brown.

Dorsum has no bands, marks or ridges. Antennæ (fig. 6) of 9 segments; segment 2 longest, one-third longer than 9, which is next; segment 3 next longest and about three-quarters the length of 2; segment 1 usually next, although it is sometimes longer than 3, and sometimes sub-equal with 5; segment 4 is shorter than 5; 5 is usually shorter than 3, but is always appreciably longer than 4, 6, 7, or 8; 6 and 7 usually sub-equal; 8 often sub-equal with 6 and 7, but usually shorter.

Formula 293 (15) 4 (67) 8. Segments of antennæ with moderately stout hairs, segments 1, 4, 6, 7 and 8 having one ring and the others two or more rings of hairs. See figure of antenna.

Legs.—Femur fairly stout, being nearly half as wide as long (width 116μ , length 282μ), surface bears numerous bristles; tibia fairly stout (width 42μ , length 282μ), equal in length to the femur, bears numerous fairly stout spines; tarsus conical, not quite one-half the length of the tibia (length 105μ), several spines and a pair of long, slender digitules; claw rather small (length 34μ), a pair of fairly stout, knobbed digitules.

Anal lobes and ring normal.

Ovisac.—The one ovisac which I have found was on the stem of *Kallstroemia brachystylis*, Vail., and was about 7 mm. long, 4 mm. wide, and rather loose in texture.

Eggs and newly-hatched larvæ pale yellow; male as yet unknown.

Habitat.—In nests of *Solenopsis geminata*, Fab., about the roots of

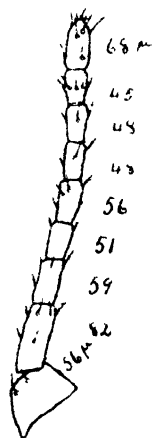


FIG. 6.

Bærhavia spicata, Choisy, and of *Kallstræmia brachystylis*, Vail. These plants grow on the sandy mesa, in the atriplex belt, and on digging around their roots one is apt to find a nest of this ant; and on the roots, either just at the surface or up to the depth of an inch below, the Coccids are found. I have also found a few of them on the stems of *K. brachystylis*, which are prostrate. Found October 15th, 1897, on grounds of the N. M. College of Agriculture and Mechanic Arts.

Remarks.—This Coccid would at first thought be taken for *Phenacoccus helianthi*, Ckll., which occurs in the same locality and is found quite abundantly in early spring on a *Phacelia*, sp., but they differ in the following respects: *P. helianthi* has the caudal and lateral filaments quite prominent, and there are well-marked dorsal ridges; all these are absent in this species. In *helianthi*, segments 2 and 3 of the antennæ are usually longer than in this, 2 being about 90 μ , and 3, 80 μ , which is considerably longer than the third in this species; 9 is about the same length in both species. The formula of *helianthi* is 239 45 16 (78). This species is also broader and thicker in proportion to its length.

The ovisac of *helianthi* is also much more compact in texture than in this one. From *P. Americanae*, King and Ckll., it differs in having the legs and antennæ much larger, and in having ninth joint shorter than either 2 or 3.

This is the first Coccid found associated with ants in New Mexico.

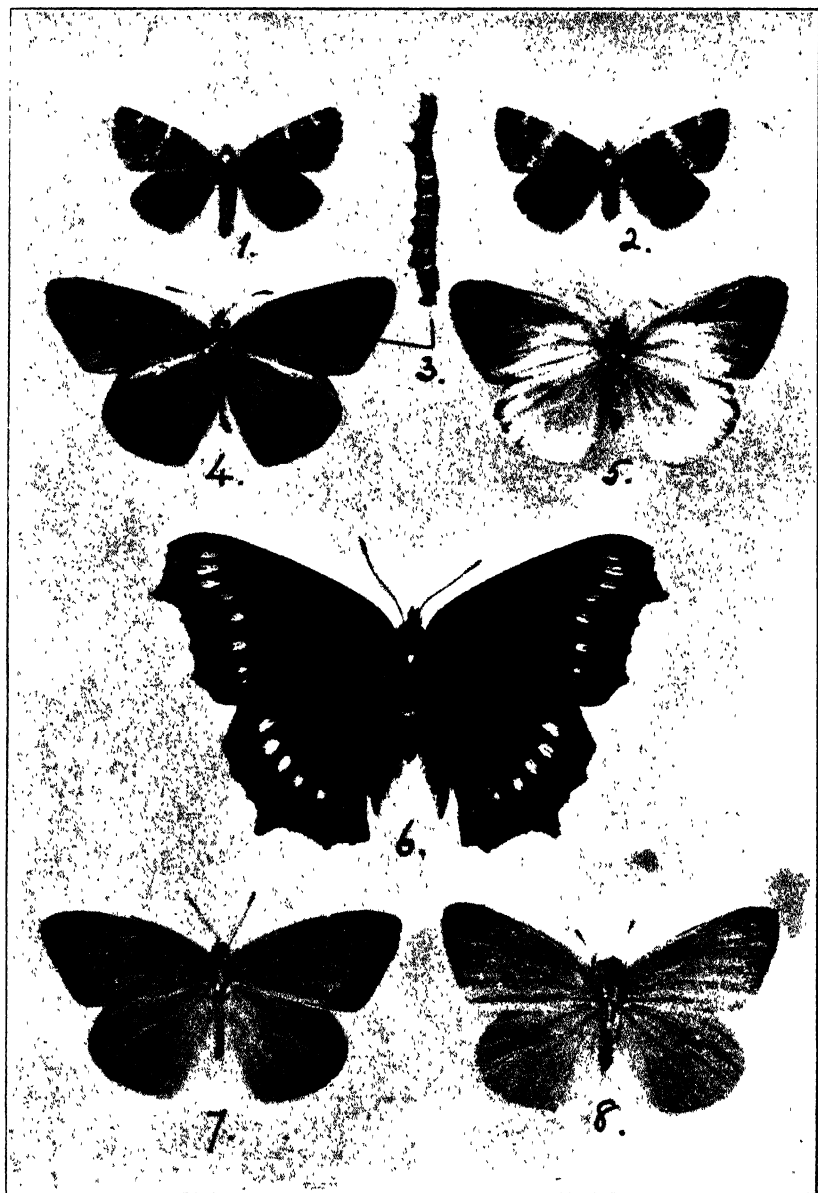
BOOK NOTICE.

STORIES OF INSECT LIFE.—By Clarence Moores Weed. Ginn & Company, Publishers, Boston, U. S. A., and London; pp. 54, with many illustrations. Price, 25 cents.

The title indicates the nature of the book, and no one will mistake the figure of the well-known "Mourning Cloak" butterfly on the front cover, even though no attempt was made in the way of colour. This is for the young people, and just the thing for boys and girls who are romping and playing over the fields and meadows, securing that most important element in an education, health. The insects treated of are the most common, and this is a great advantage, because it is usually the things that are the nearest to us that we know the least about. Get the children to observe the common things carefully, and they will be all the better prepared to look after the uncommon, later on in life. I only wish that some philanthropist would buy up the whole edition of this work and present them to the school children of the country. Surely it would help to make better men and women of many boys and girls, and open up to them a world of wonders that are to be seen by any, no matter how lowly, provided they only know how and where to look.

F. M. W.

Mailed February 4th, 1898.



A RARE ABERRATION OF *VANESSA ANTIOPA*, ETC.

The Canadian Entomologist.

VOL. XXX.

LONDON, MARCH, 1898.

No. 3.

A RARE ABERRATION OF VANESSA ANTIOPA.

BY HENRY H. LYMAN, MONTREAL.

In figure 6 of the accompanying plate we have a fair representation of a most interesting aberration of *Vanessa Antiopa*. This differs from the normal form in the most striking manner, all yellow of the border and the yellow markings on the costa above being replaced by deep brown. Below, the border and the few yellow markings of the normal form are of a very smoky hue, though by no means as dark as above.

It was taken by Mr. C. D'B. Green, at Boundary Creek, B. C., on 23rd August, presumably in 1895. Mr. Green knocked the specimen down with his hat, as he had no net, and it was thus slightly damaged, but is in very good condition considering the manner of its capture. The specimen is a ♀. A somewhat similar aberration is described by Dr. Strecker in his "*Butterflies and Moths of North America*" as being in his collection as follows: "‡ ab. b. ♀—With the border on upper side of primaries black instead of yellow," from which I judge that in that case the secondaries were normal. Of course for *black* we should probably read *dark brown*, as I do not believe that any specimen of *Antiopa* has ever been seen with a really black border.

If this aberration should be found to recur and to become entitled to be considered a variety, I would suggest the name *Hippolyta*, a queen of the Amazons of whom *Antiopa* was another queen.

The other figures on the plate are as follows:

No. 1—*Brephos Infans*, Moeschl., ♂.

No. 2— " " " ♀.

No. 3— " " " blown larva.

These illustrate Mr. T. Dwight Brainerd's paper on the preparatory stages of this species, CAN. ENT., XXIX., 272.

No. 4—*Colias Philodice*, Scud., ♂, var. *Melanic*.

No. 5— " " " ♀, " *Albinic suffused*.

Described by Mr. T. Dwight Brainerd, CAN. ENT., XXVIII., 305.

No. 7—*Colias Interior*, Scud., ♂, from Cartier, Ont.

No. 8— " " " ♀, " the *Adirondacks*.

These illustrate my paper on the life history of this species, CAN. ENT., XXIX., 249.

NEW AND LITTLE-KNOWN BEES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Chelynia rubifloris, n. sp.—♀. Eight mm. long, black, with sparse grayish and white pubescence. Head almost as large as thorax, quadrate, produced behind the eyes, cheeks very broad; cheeks, vertex and face very strongly and closely punctured; region of antennæ with some dull white hair; ocelli in a triangle; antennæ rather short, black, last joint compressed, funicle longer than first flagellar joint, first flagellar joint conspicuously longer than second or third; clypeus broad and low, punctured all over, its anterior margin bearing a small tooth at each side, and in the middle a long, narrow projection, like the thoracic spine of some species of *Oxybelus*. Mandibles black, stout, obscurely bidentate at the obliquely truncate ends. Labrum greatly produced, hollowed beneath, sides parallel, end truncate. Tongue very long, linear; maxillæ greatly elongated; penultimate joint of labial palpi broadened at apex, shorter than the last; basal joint not quite half, but more than one-third, length of second; maxillary palpi small, three-jointed, the joints subequal. Thorax rather small, strongly and closely punctured; base of metathorax coarsely wrinkled, bounded by an obtuse rim. Tegulæ black, punctured. Wings smoky, nervures and stigma black, stigma well-formed but small; marginal cell long, with an obtuse apex away from costa; two submarginal cells, second receiving first recurrent nervure at a distance from base nearly equal to length of first transverso-cubital nervure, and second recurrent very near the apex. Legs black, with thin whitish pubescence. Abdomen punctured, with obscure silvery pile towards the end; hind margins of segments with white hair-bands, very broadly interrupted on the first three segments, on the first reduced to lateral patches. Venter with a fairly abundant white scopa.

Hab.—Seattle, Washington State. (T. Kincaid.) Two at flowers of *Rubus ursinus*, May 14.

In describing this extraordinary bee I have given the generic as well as specific characters. Provancher placed his genus *Chelynia* among the Pauurgine Andrenidæ, but the insect now described is an Apid allied closely to *Heriades*, and especially to *Ashmeadiella*. This circumstance, and the fact that Provancher's *C. labiata* does not exhibit the remarkable clypeal process, might seem to throw doubt on the generic identification; but the large head, the extraordinary labrum, etc., are all as Provancher describes, and it seems very improbable that he could have had another genus before him.

Ashmeadiella Holtii, n. sp.—♂. Length nearly 6 mm., head and thorax black, abdomen and legs mostly ferruginous. Head nearly as large as thorax, eyes very large; face about square, covered with snow-white pubescence, as also are the cheeks; vertex punctured, with thin pale mouse-coloured pubescence; antennæ short, flagellum dull ferruginous beneath; mandibles ferruginous, tridentate, the outer tooth long, slender and black. Thorax not very closely punctured, the pubescence white beneath and at the sides, grayish above. Tegulæ amber colour. Wings short, quite clear. Legs ferruginous with white pubescence; anterior coxæ and femora and middle coxæ and femora more or less blackened. Abdomen punctured, ferruginous; first segment black at base, and dorsal middle of second and third segments suffused with blackish; no distinct hair-bands, but apex largely clothed with white hair; apex with four teeth, the median ones somewhat further from each other than from the lateral.

Hab.—College Farm, Mesilla Valley, New Mexico, May 2, 1895. Collected by Mr. Alfred Holt. Allied to *A. bigeloviae*, but very distinct by the red abdomen.

Halictus olympiæ, n. sp.—♀. Nearly 10 mm. long, black. In structure, colour, the shiny surface, the white patches on the abdomen, etc., this agrees with *H. pectoraloides*; it differs, however, in being considerably larger, and much broader in every way; the abdomen is very broad, and the head is transversely oval, with an extremely broad face. The abdomen, including the first segment, is very distinctly punctured. The antennæ are proportionately longer than in *pectoraloides*, and the mesothorax is more closely punctured. The base of the metathorax is covered with quite regular, strong, longitudinal ridges. The tegulæ are shining, piceous, with a brown spot and a pale edge. Wings slightly smoky, nervures and stigma dark brown. Hind spur of hind tibia with numerous short teeth.

Hab.—Olympia, Washington State, June 26, 1896. (T. Kincaid.) Also from Olympia, Mr. Kincaid sends what may be called *H. olympiæ*, var. *subangustus*. It differs from the type by the narrower and more hairy face, the translucent pale testaceous tegulæ, and the narrower basal enclosure of the metathorax. It is possible that *subangustus* is a distinct species, but I think it is only a variety.

Halictus Kincaidii, n. sp.—♀. About 8 mm. long, black. This is another species of the type of *pectoraloides*, from which it differs thus:

It is more robust, with a broader abdomen ; the wings are quite smoky ; the pubescence of the face and thoracic dorsum are mouse colour ; the face is perceptibly broader ; the tegulæ are piceous and *punctured all over* ; the mesothorax is dull and strongly and closely, though irregularly, punctured ; the enclosure of the metathorax is somewhat more strongly subreticulately wrinkled ; the bases of the abdominal segments are dullish, but there is no well-defined punctuation.

Hab.—Olympia, Washington State, June 13, 1895.

H. similis, Smith, which Mr. Kincaid took at Olympia in May and June, differs from *Kincaidii* at once by its honey-coloured (instead of piceous) stigma, broader head, and impunctate tegulæ. From *H. olympicæ*, *similis* is readily known by the impunctate abdomen, and the hind spur of hind tibia pectinate with four teeth, instead of dentate-serrate. The spur is also pectinate in *Kincaidii*. *H. similis*, it may be remarked, differs from *H. arcuatus* by the impunctate first abdominal segment and the larger second submarginal cell, etc. *H. olympicæ*, v. *subangustus*, is much like *arcuatus*, but is readily known from it by its broader face and dark stigma.

Halictus Lerouxii, var. *ruborum*, n. var.—♀. Somewhat smaller than usual ; pubescence all strongly tinged orange or yellowish-rufous ; tegulæ reddish-brown (or sometimes quite dark), distinctly punctured along the margin ; tarsi mostly, and hind tibiæ behind, clear ferruginous. Hind spur of hind tibia pectinate with about nine teeth, only the first three large.

Hab.—Seattle, Washington State, May 14, on *Rubus ursinus*. (T. Kincaid.) This looks like a distinct species, but other *Lerouxii* from Seattle are intermediate between it and the type, having the legs dark, but the pubescence and tegulæ of *ruborum*. Some *Lerouxii* from Olympia (Kincaid) are hardly larger than *coriaceus*, but the broad face still distinguishes them.

It may be remarked here that Mr. Kincaid takes at Olympia not only *H. Lerouxii* and *H. coriaceus*, but also *H. sisymbrii*, Ckll, a species hitherto reported only from New Mexico. I have also identified from the Olympia material *H. fasciatus*, Nyl., Rob., and *H. confusus*, Sm., Rob.

Halictoides Tinsleyi, n. sp.—♀. Six mm. long, black, with rather sparse dirty-white pubescence. Head rather small, facial quadrangle about square, face and cheeks quite hairy ; antennæ very short, wholly dark, flagellum quite thick ; vertex appearing coarsely granular from the

very close punctuation, clypeus with lateral projecting angles; tongue apparently rather short, nearly as in *Hemihalictus*; mesothorax dull and granular from the excessively close punctures; base of metathorax semilunar, with fine longitudinal plications or striæ; tegulæ piceous. Wings smoky, iridescent, nervures and stigma black or piceous; stigma rather small, basal nervure noticeably but not abruptly bent; second submarginal cell about as long as the first, receiving the first recurrent nervure at less than one fourth from its base, and the second (at a right angle) about one-sixth from its tip. Legs black, with whitish hairs; hind legs with a rather abundant scopa, carrying considerable yellow pollen. Abdomen hardly punctured, except that the first segment near its base exhibits large scattered punctures; hind margins of segments pallid; apical half of abdomen pruinose with pale hairs.

Hab. -Five taken by Prof. J. D. Tinsley at flowers of *Gymnolomia multiflora*, in Soledad Canon, Organ Mts., New Mexico, 7,000 feet alt., Sept. 25, 1897. I am not quite sure about the generic position of this little bee. The tongue suggests *Hemihalictus*, but the wings are entirely those of *Halictoides*, and differ from *Hemihalictus*. I sent an example of *H. Tinsleyi* to Mr. W. J. Fox, who kindly compared it with Cresson's types of "*Panurgus*," and writes that it "is apparently different from any here. It is not *fimbriatus*, which has the abdomen much more hairy. It may be the ♀ of *nigrifrons*, but I am inclined to think not." (*Litt.*, Nov. 5, 1897.)

ON THE DIPTEROUS GENUS EUSIPHONA.

BY D. W. COQUILLETT, WASHINGTON, D. C

At the time of establishing this genus, in my recent revision of the Tachinidæ, I had only two specimens before me; in both of these the wings are bent backward in such a manner as to prevent a critical examination of the lower calypteres, but as the specimens otherwise agree quite closely with the Tachinid genus *Gymnophania*, I concluded to place the present genus next to it. The recent examination, however, of a perfect specimen from Mr. Charles Robertson, of Carlinville, Illinois, reveals the fact that the lower calypteres are extremely small, being, in fact, rudimentary, and this genus must therefore be transferred from the Tachinidæ to the superfamily Acalyprata. In all the essential characters it agrees with the family Agromyzidæ, and its proper place is evidently in the vicinity of the genus *Desmometopa*, from which it will be readily recognized by the strongly convex front and the excessively long, bristle-like proboscis.

SOME INDIANA ACRIDIDÆ. — IV.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

Since the publication of the third paper of this series in the CANADIAN ENTOMOLOGIST for August and September, 1894, my time has been so fully occupied with other duties that but little opportunity has been presented for the collection and study of Indiana Orthoptera. Notes have been made and specimens taken only of such species as came readily to hand during field work in geology. A better knowledge of the distribution over the State of many of the Acrididæ has, however, been gained, and seven species and one variety have been added to the number formerly listed, and to my private collection. Of these, one species and variety have been described as new by Prof. A. P. Morse, a second is described for the first time in the present paper, and a third has before been taken only in Montana and Nebraska.

The publication of McNeill's "Truxalinæ of North America" and of Scudder's "Revision of the Melanopli," especially the latter, has made necessary a number of changes in the synonymy of the species previously accredited to the State. A new list of all Acrididæ mentioned in this and the former papers, with their present nomenclature, is, therefore, appended. It is to be hoped that the papers as published have added something of value to the knowledge of the habits and geographical distribution of this interesting group of insects.

ACRIDIDÆ.

TRUXALINÆ.

1. ORPHULA PELIDNA (Burm).* The Spotted-winged Grasshopper.
Gomphocerus pelidnus Burm., Handbuch II., 1838, 650.
Stenobothrus pelidnus Thos., Syn. Acrid., 1873, 95.
Orphula pelidna Rev. Trux., N. A., 1897, 235.
Stenobothrus maculipennis Scudd., Bost. Jour. Nat. Hist., VII., 1862, 458.
Orphula maculipennis Morse, Psyche, VII., 1896, 326.
Stenobothrus propinquans Scudd., Bost. Journ. Nat. Hist., VII., 1862, 461.

This species has been described or mentioned under the above names by many different persons, and no attempt is made to give a com-

*When the author of a species referred it to a different genus from that to which it is now recognized as belonging, his name is enclosed in a parenthesis,

plete synonymy. That given by McNeill, loc. cit., is faulty and misleading to beginners, in that the name *Gomphocerus* is wrongly used for *Stenobothrus* in a number of the references.

Although it is said to occur in abundance in the United States east of the Rocky Mountains, I did not meet with this species in Indiana during ten years collecting until the 27th of last July, when I found it in abundance about the margins of a small lake in one of the valleys among the sand dunes of Lake County.

It uses both the wings and legs in flight, and when close pressed often burrows into the fallen grass in an attempt to escape detection. Of twenty-one specimens taken but three were females, and they were of the green variety. Five of the males were also partly green, the remainder being brown and fuscous.

2. *MECOSTETHUS LINEATUS* (Scudder.)

Arcyptera lineata Scudd., Bost. Jour. Nat. Hist., VII., 1862, 462.

Id., Am. Nat., II., 1868, 118. (Song of.)

Id., Proc. Bost. Soc. Nat. Hist., XI., 1868, 8.

(Note of set to music.)

Id., Dist. Ins. of N. Hamp., 1874, 373.

Smith, Rep. Conn. Bd. Agri., 1872, 381.

McNeill, Psyche, VI., 1891, 66.

Stetheophyma lineata Thos., Syn. Acrid., 1873, 98.

Id., Ninth Rep. St. Entom., Ill., 1880, 104.

Fernald, Orth. N. Eng., 1888, 38.

Bruner, List Neb. Orth., 1893, 23.

Morse, Psyche, VII., 1894, 105.

Mecostethus lineatus Morse, Psyche, VII., 1896, 327, 444, figs 13-13b.

McNeill, Rev. Trux. N. Am., 1897, 254, figs 22a, 22b.

The range of this species as given by McNeill is "N. Eng. to N. Ill. and Iowa." He also adds that it is a "rare species, reported but a few times." The above synonymy includes all references to it by American writers. Some of these references, as those of Thomas, Smith, and Fernald, were based on Scudder's writings, the author not having collected it in person. The only definite localities from which it has been recorded are: Norway, Me.; Williamstown and Andover, Mass.; Valley of the Red River of the North, by Scudder; North Haven and

Thompson, Ct., and Readville, Sherburn and Newtonville, Mass., by Morse; and Iowa side of Mississippi, opposite Watertown, Ill., by McNeill. Bruner also reports it as "occurring in the timbered parts of the eastern half of Nebraska," a fact which McNeill seems to have overlooked.

It was noted for the first time in Indiana on July 13th, 1894, when a single male was secured from open ground near the side of a tamarack swamp, just north of Kewanna, Fulton Co. On the following day it was found in small numbers in a boggy meadow between two spurs of another tamarack swamp, just west of Lear's Lake, in the same county. The males were very wild, taking to flight when a person was a dozen yards or more away. They used the wings only in escaping, flying swiftly and noiselessly for 50 to 100 feet and alighting on the stems of tall grass. The only way in which I could effect their capture was by running after them and swooping them with the net as they arose or before they had time to arrange their legs for the upward impetus at the beginning of a new flight. But two females were seen. They were much darker and more bulky and lubberly than the males, and being in a more open place, where the grass was shorter, were easily taken. The species probably occurs in the vicinity of tamarack swamps and peat bogs throughout the northern half of Indiana, though it was not noted about several which have been visited in the last three years.

OEDIPODINÆ

3. PSINIDIA FENESTRALIS (Serville.) The Long-horned Grasshopper.

Oedipoda fenestralis Serv., Hist. Nat. des Orth., 1839, 726.

Thos., Syn. Acrid., 1873, 118.

Locusta fenestralis Harris, Ins. Inj. Veg., 1862, 177.

Psinidia fenestralis Stal., Recens. Orth., I., 1873.

Sauss., Prod. Oedipod., 1884, 161.

Fern., Orth. N. Eng., 1888, 44.

Beut., Bull. Am. Mus. Nat. Hist., VI., 1894, 303, Pl. VIII.

Morse, Psyche, VIII., 1897, 111, fig. 28.

Locusta eucrata Harris, Ins. Inj. Veg., 1862, 180.

Oedipoda eucrata Scudd., Bost. Journ. Nat. Hist., VII., 1862, 472.

This handsome little Acridian has been mentioned by numerous other writers under the names given above, but it is not thought best to give the full synonymy in this connection. The species evidently occurs

from the Atlantic to the Rocky Mountains, wherever there are extensive sand-covered areas, having been reported from Colorado and Canon Cities, by Uhler; from north-west Nebraska, by Bruner; from Illinois, by McNeill; and from various points on the Atlantic coast between Maine and Louisiana, by Harris, Scudder, Smith, Morse, and others.

In Indiana, it has been noted only in Lake and Porter counties in the sandy area bordering Lake Michigan, where it was first taken July 27, 1897. It is most common along the beach within one-half mile of the lake, in company with *Trimerotropis maritima* (Harris) and *Sphargemon wyomingensis* (Thos.), though a few specimens were taken on sandy ridges five miles from the lake shore. It has a quick, short flight, and always chooses a bare, sandy spot on which to alight. Unless it is carefully "marked down" it is then very difficult to distinguish, since its colours harmonize so perfectly with its surroundings. By keeping an eye on it, and stealthily approaching, it can be readily taken by throwing the net quickly over it just as it is in the act of rising. The male makes a slight rattling sound as it flies, but the movement of the female is noiseless. The majority of the specimens seen had the inner wings a bright red at base, though variations in colour, from light yellow to deep red, were frequent.

ACRIDINÆ.

4. MELANOPLUS EXTREMUS (Walker.)

Caloptenus extremus Walker, Cat. Dermap. Salt., IV., 1870, 681.

Melanoplus extremus Scudd., Proc. U. S. Nat. Mus., XX., 1897, 287, Pl. XVIII., fig. 10.

Pezotettix junius Dodge, Can. Ent., VIII., 1876, 9.

Melanoplus junius Scudd., Proc. Bost. Soc. Nat. Hist., XIX, 1878, 286.

Caloptenus junius Scudd., Can. Ent., XX., 1880, 75.

Caloptenus parvus Provancher, Nat. Canad., VIII., 1876, 110.

This species has also an extensive synonymy, the above being but a small portion, showing the names under which it has heretofore been known. It is an insect of northern range, Walker's type being recorded from Arctic America. According to Scudder "it probably occurs throughout the larger part of Canada and the northernmost United States. It has also been recorded from several points in Alaska."

Mr. C. H. Bollman evidently found it near Bloomington, Monroe County, Indiana, since Scudder mentions a specimen so labeled as

occurring in the U. S. Nat. Museum. It first came to my notice in the State on August 8, 1897, when it was found near DeLong, Fulton County, in an open peat bog which was surrounded on all sides by a heavy growth of tamarack, *Larix americana* Michx. But about a dozen specimens were secured, all of which were of the short-winged form, *M. e. junius*, the measurements of male being: length of body, 18 mm.; of tegmina, 11 mm.; of hind femora, 11.5 mm.

When disturbed they gave several short, quick leaps, and then burrowed as far as they could into the dense mass of sphagnum moss which everywhere covered the bog.

5. *MELANOPLUS ANGUSTIPENNIS* (Dodge.) The Narrow-winged Grasshopper.

Caloptenus angustipennis Dodge, Can. Ent., IX., 1877, 111.

Thos., Rep. U. S. Ent. Comm., I., 1878,
43.

Melanoplus angustipennis Bruner, Bull. Wash. Coll. Lab. Nat. Hist.,
I., 1885, 138.

Id., Bull. 28, U. S. Div. Ent., 1893, 24,
fig. 12.

Scudd., Proc. U. S. Nat. Mus., XX., 1897,
305, Pl. XX., fig. 6.

This is a western species which has not heretofore been recorded east of Kansas and Iowa. According to Bruner, it ranges from North Dakota to Texas, and west to Yellowstone, Montana. He also states that it is increasing rapidly in numbers, and is likely in places to become a serious pest.

It is one of the most common grasshoppers about the south shore of Lake Michigan, occurring in company with *M. atlantis* (Riley), *Spharagemon wyomingensis* (Thos.), and others over a large part of the sandy area within five miles of the lake. It seems to prefer such barren localities to those more promising in plant food, since Bruner mentions its partiality for "old breakings and well-fed pastures of many years' use."

To a cursory observer *angustipennis* bears a general resemblance to *atlantis* (Riley), but may be readily distinguished by its blue tibiae, the lack of a notch at the apex of the last abdominal segment of the male, and the different shape of the male cerci. The dark spots along the middle line of the tegmina of the Indiana specimens are larger and more numerous than one would expect to find after reading the descriptions of Dodge

and Scudder. Its habits, moreover, are not arboreal, as observed by Bruner, since it was more often found on the ground than on the scant vegetation growing in the area which it inhabited.

6. *PAROXYA SCUDDERI* sp. nov.

The smallest known member of the genus, the body of the male averaging but 17 mm. in length. Antennæ relatively short, 9.5 mm. in both sexes. Tegmina reaching slightly beyond tip of abdomen in male, shorter than abdomen in female.

Male with posterior lobe of pronotum, tegmina, and upper and outer faces of all the femora a uniform light wood brown; occiput and anterior lobes of pronotal disc darker. A broad black stripe extends from eye along the upper half of the lateral lobes of pronotum as far as the posterior transverse sulcus, where it ends abruptly, the posterior lateral lobe being uniform in colour with the disc. Below this black stripe is one of ivory white, brightest on the head. Metapleurite also ivory white. Face grayish olive, flecked or tinged with yellowish. Proximal two-thirds of antennæ the colour of the tegmina; distal third darker. Palpi and prosternal spine yellow. Sternites of thorax olive brown; those of abdomen yellow, as also the lower face of all the femora. Hind tibiæ pale glaucous (the proximal third sometimes light brown), with a black spot at geniculation; the spines eleven in number in the outer series, with their distal thirds black.

Female darker; the tegmina sometimes obscurely and sparingly flecked with fuscous, covering three fourths or more of the abdomen; the yellow of under side dull or wanting.

Supra-anal plate of male very short, triangular, with a short, basal, triangular sulcus, in which rest the furcula. These consist of a pair of flattish, oblong, subequal plates with their inner edges attingent except at the apices, where they slightly diverge. Cerci strongly incurved, narrowed at the middle, the proximal half stouter than in *P. hoosieri*, the distal third flattened and rounded apically.

Average measurements: Length of body, male 17 mm., female 24 mm.; antennæ, male and female, 9 mm.; tegmina, male 13 mm., female 14.5 mm.; hind femora, male 11.5 mm., female 13.5 mm. Five males, 4 females.

This graceful-bodied species was found in small numbers on July 27, 1897, about the grassy margins of a pond in the sand dune region

north of Miller's, Lake County, Indiana, and within one-half mile of the shore of Lake Michigan. On the following day a single pair were taken from a similar locality near Tolleston, in the same county, and about four miles from the lake, but still within the sand-covered area. It was usually found clinging to the stems of the tall rushes and grasses common in such locations, and when disturbed the males used the wings in a noiseless flight, while the females depended upon their leaping powers to escape. When closely followed, they would attempt to hide by burrowing in the fallen grass.

The form is more closely allied to *P. atlantica* Scudder, than to either of the other two known species of the genus, but its smaller size, longer cerci, and the different shape of the male furcula at once distinguish it. I take pleasure in naming it in honour of Mr. S. H. Scudder, who in the past has rendered me much aid in my study of Acrididæ, and who has done far more than any other man towards putting the study of North American Orthoptera on a substantial basis.

TETTIGINÆ.

7. TETTIGIDEA ARMATA Morse.

Tettigidea armata Morse, Journ. N. Y. Ent. Soc., III., 1895, 107.

This species was described from specimens collected by me in Vigo County. It was formerly confounded with *T. lateralis* Say, but is distinguished by having the anterior margin of the pronotum produced in a sharply pointed cusp, instead of being rounded or obtusely angulate, and in having the dorsum of pronotum strongly rugulose, with the median carina sharp and distinct. One pair, *in coitu*, were taken June 20, 1894, from the wooded margin of a large pond in the lowlands of the Wabash River. It has also been taken about the margin of a lake near Waterloo, DeKalb County, and, according to Morse, near Dallas, Texas.

7a. TETTIGIDEA ARMATA DEPRESSA Morse.

T. armata depressa Morse, *loc. cit.*, 107.

This differs from the above in that the pronotum only reaches the tip of the hind femora instead of much surpassing them. A single female in my collection from Vigo County served as one of Morse's types, the others being from Florida and Louisiana. According to Hancock (Trans. Am. Ent. Soc., XXIII., 1896, 242), *Tettigidea acuta* Morse, occurs at Chicago and Riverside, Illinois. It is therefore, doubtless, a resident of Indiana.

NOTES ON SOME OF THE SPECIES MENTIONED IN THE PREVIOUS PAPERS.

TRUXALIS BREVICORNIS (L.) (C. E., XXIII, 75; XXVI., 221.)

This well-marked species occurs sparingly about the borders of marshes in Lake County, so that its range includes the whole State.

CHLÆALIS CONSPERSA Harris. (C. E., XXIII., 75; XXVI., 222.)

The males of this species, which before had been rarely met with, were found in numbers in low, rather dry woods along the borders of streams in Montgomery County, in July, 1895. A female was taken at dusk on the evening of July 21, in the act of ovipositing in the end of a partly decayed oak log. Three eggs were found in the bottom of the cavity in which the abdomen was inserted.

HIPPISCUS TUBERCULATUS (Pal. d. Beauv.) (C. E., XXIII., 81.)

This is the *H. phænicoptera* of my first paper. In Indiana it has been found only in the driftless limestone area of the southern half of the State, being especially common in Monroe and Franklin counties. Adults have been taken as early as April 20th, and as late as August 15th. It frequents timothy meadows, upland pastures, and roadsides, and when in flight is very conspicuous owing to its large size and bright red inner wings. In suitable localities, the young of this species, as well as those of *Arphia sulphurea* (Fab.) and *Chortophaga viridifasciata* (DeGeer) are, on bright days in midwinter, often to be seen together in numbers jumping vigorously about. If their presence at such a season comes to the attention of a newspaper reporter, the press of the entire State is apt to teem with notices of a coming grasshopper plague, of which the youngsters are said to be the advance guard.

SPHARAGEMON WYOMINGENSIS (Thos.) (C. E., XXXVI., 218.)

The *Spharagemon oculatum* Morse, of my third paper has since been determined by Prof. Morse to be identical with the species described by Thomas under the above name. It occurs in sandy localities in the northern part of Indiana, being especially common in the immediate vicinity of Lake Michigan. It reaches maturity about July 10th, and may be taken until mid-October.

TRIMEROTROPIS MARITIMA (Harris.) (C. E., XXVI., 218.)

Since my former mention of this species it has been found to be very common along the south shore of Lake Michigan, in Lake, Porter, and

LaPorte counties. It flies rapidly for long distances, and unless carefully marked down, is very difficult to detect. It varies in colour from very light gray to a dark gray mottled with brown; the darker specimens being found at some distance from the lake, where there was a scattering vegetation, the light-coloured ones on the pure sand of the immediate shore. It was seen nowhere more than a half mile back from the water margin, and then only on the bare crests of the highest sand ridges and dunes.

MELANOPLUS OBOVATIPENNIS (Blatchley.) (C. E., XXIII., 80; XXVI., 241.)

In Scudder's recent monograph of the Melanopli, this species is transferred from *Pezotettix* to *Melanoplus*. It has been recently found in Marion, Franklin, and Crawford counties, and therefore probably occurs in high, dry woodlands over the southern part of the State. It is also recorded by Scudder, from Kentucky, Missouri, and near Dallas, Texas.

MELANOPLUS BLATCHLEYI Scudder. (C. E., XXIII., 81; XXVI., 243.)

This is the species formerly known as *Pezotettix occidentalis* Bruner. In Scudder's revision it was also transferred to the genus *Melanoplus*, in which the name *occidentalis* was preoccupied.

It is found from June 15th to November 1st, in open woods. On October 25th, 1897, two specimens were taken in Marion County, from the side of a hackberry tree, *Celtis occidentalis* L. This is the most eastern point at which it has been noted in the State.

MELANOPLUS DIFFERENTIALIS (Uhler.) (C. E., XXIII., 99.)

The general range of this species is southern, but specimens have been taken in Lake County, in the extreme north-western part of the State. It is very common in the Wabash valley.

MELANOPLUS PUNCTULATUS (Uhler.) (C. E., XXIV., 30; XXVI., 245.)

This is the *M. griseus* Thos., of my former papers, Scudder having determined that to be a synonym of Uhler's species.

It has proven to be of more general distribution over the State than at first supposed, having been taken in Vigo, Putnam, Montgomery, Fulton, and Marion counties. With the exception of those formerly noted as found in the tamarack swamp in Fulton County, where it was frequent, but one or two specimens have been taken each season, and they in damp localities in late autumn. On October 25, 1897, two specimens were

secured from the trunks of trees in a low, dense woods in Marion County. They were about four feet from the ground, and one of them was beneath a chunk which was leaning against the tree.

PAROXYA HOOSIERI (Blatchley.) (C. E., XXIV., 31; XXVI., 244.)

On account of distinctive characters pertaining to the abdominal appendages of the male, Scudder regards this as a valid species. It has been taken about swamps in Vigo, Fulton, and Marshall counties, Indiana, and near Oberlin, Ohio. On September 22, 1894, I was much surprised to find, near the border of a marsh in Vigo County, a female of this species and also one of *Chlœaltis conspersa* Harr., a few inches apart on the stump of a downy poplar, *Populus heterophylla* L., each with the abdomen buried to the full length in the wood, but no eggs could be discovered. Nothing has been recorded concerning the habits of oviposition of the members of the genus *Paroxya*, and it would be surprising if they, like the *Chlœaltis* mentioned, should seek wood rather than earth as the receptive matrix for the eggs.

A REVISED LIST OF THE ACRIDIDÆ KNOWN TO OCCUR IN INDIANA.

ACRIDIDÆ.

TRUXALINÆ.

1. *Truxalis brevicornis* (Linn.) Short-horned Grasshopper.
2. *Syrbula admirabilis* (Uhler.) Handsome Grasshopper.
3. *Chlœaltis conspersa* Harris. Sprinkled Grasshopper.
4. *Dicromorpha viridis* (Scudder.) Short-winged Green Grasshopper.
5. *Orphula pelidna* (Burm.) Spotted-winged Grasshopper.
6. *Mecostethus lineatus* (Scudder.)
7. *Stenobothrus curtippennis* (Harris.) Short-winged Brown Grasshopper.
8. *Ageneotettix scudderi* (Bruner)

OEDIPODINÆ.

9. *Arphia xanthoptera* (Burm.)
10. *Arphia sulphurea* (Fab.) Yellow-winged Grasshopper.
11. *Chortophaga viridifasciata* (DeGeer.) Green-striped Grasshopper.
12. *Encoptolophus sordidus* (Burm.) Clouded Grasshopper.
13. *Hippiscus tuberculatus* (Pal. de Beauv.) Coral-winged Grasshopper.
14. *Hippiscus rugosus* (Scudder.) Clumsy Grasshopper.
15. *Dissosteira carolina* (Linn.) Quaker or Black-winged Grasshopper.
16. *Spharagemon bolli* Scudder.
17. *Spharagemon wyomingensis* (Thomas.)

- 18. *Psinidia fenestralis* (Serville.) Long-horned Grasshopper.
- 19. *Trimerotropis maritima* (Harris.) Maritime Grasshopper.

ACRIDINÆ.

- 20. *Leptysma marginicollis* (Serville.) Slender-bodied Grasshopper.
- 21. *Schistocerca americana* (Drury.) American Grasshopper.
- 22. *Schistocerca alutaceum* (Harris.) Leather-coloured Grasshopper.
- 23. *Melanoplus atlantis* (Riley.) Lesser Grasshopper.
- 24. *Melanoplus scudderi* (Uhler.) Scudder's Short-winged Grasshopper.
- 25. *Melanoplus viridipes* Scudder. Green-legged Grasshopper.
- 26. *Melanoplus obovatipennis* (Blatchley.) Obovate-winged Grasshopper.
- 27. *Melanoplus femur-rubrum* (DeGeer.) Red-legged Grasshopper.
- 28. *Melanoplus extremus* (Walker.)
- 29. *Melanoplus angustipennis* (Dodge.) Narrow-winged Grasshopper.
- 30. *Melanoplus blatchleyi* Scudder.
- 31. *Melanoplus gracilis* (Bruner.) Graceful Grasshopper.
- 32. *Melanoplus minor* (Scudder.)
- 33. *Melanoplus collinus* Scudder.
- 34. *Melanoplus differentialis* (Uhler.) Lubberly Grasshopper.
- 35. *Melanoplus bivittatus* (Say.) Yellow-striped Grasshopper.
- 36. *Melanoplus punctulatus* (Uhler.) Mottled Grasshopper.
- 37. *Paroxya hoosieri* (Blatchley.) Hoosier Grasshopper.
- 38. *Paroxya scudderi* Blatchley.

TETTIGINÆ.

- 39. *Nomotettix cristatus* (Harris.) Crested Grouse Grasshopper.
- 39a. *Nomotettix cristatus carinatus* (Scudder.)
- 40. *Tettix ornatus* (Say.) Spotted Grouse Grasshopper.
- 40a. *Tettix ornatus triangularis* Scudder.
- 41. *Tettix granulatus* (Kirby.) Sprinkled Grouse Grasshopper.
- 42. *Tettix arenosus* Burm. Grizzly Grouse Grasshopper.
- 43. *Paratettix cucullatus* (Burm.) Hooded Grouse Grasshopper.
- 44. *Tettigidea lateralis* (Say.) Black-sided Grouse Grasshopper.
- 45. *Tettigidea parvipennis* (Harris.) Small-winged Grouse Grasshopper.
- 45a. *Tettigidea parvipennis pennata* Morse.
- 46. *Tettigidea polymorpha* (Burm.)
- 47. *Tettigidea armata* Morse.
- 47a. *Tettigidea armata depressa* Morse.

NOTES ON COLLECTING "AT LIGHT."

BY A. W. HANHAM, WINNIPEG, MAN.

(Continued from page 36.)

July 23rd: Lots of things at light, but mostly common species already recorded. A fresh *Peridroma occulta* was taken, and more *Plusia striatella* and *Deva purpurigera*.

July 24th: This was an evening for the *Ichthyura*, over a dozen being captured, also some *Schizura*. *Dryopteris rosea* was still out, and several fresh *Mamestra purpurissata* came in. The absence of *Plusias* and the abundance of "snout" moths is noted in my diary. The *Coleoptera* were strongly represented by a large *Necrophorus*.

July 25th: A *Catocala briseis* — the first *Catocala* of the season — made things lively until it found its way into one of my bottles. *Plusias* reappeared, and *Noctua plecta* increased my local list. A large number of nice things in "Micros" were attracted and secured.

July 27th: This was the last evening that I record any abundance of things at light, and the following deserve mention: *Pheosia dimidiata* (1), *Crambidia pallida* (sev.), *Orgyia leucostigma* (sev.), *Parorgyia plagiata* (sev.), *Ichthyura vau* (6), *Arctia Saundersii* (3), *Acronycta impressa* (sev.), *Noctua collaris* (sev.), *Carneades flavicollis* (sev.), *Rhynchagrotis alternata* (sev.), *Homohadena badistriga* (1; two or three of this striking-looking species were taken earlier in the month), *Mamestra nimbosa* (2), *Plusia æreoides* and *bimaculata* were still showing themselves, and *Hadena niveivenosa* and *Mamestra meditata* were common. *Tricholita semiaperta*, of which I secured several, added a handsome species to my collection, and a fresh lot of *Phasiane mellistrigata* were taken, apparently a second brood.

August 4th: A pair of *Catocala briseis* and a fine *Plusia balluca* showed up among the things captured this evening; a second specimen of the latter visited me, but after a flying inspection of my quarters, wandered outside and was no more seen.

August 31st: After an absence from the city of three weeks I once more started my light trap. My catch included a dozen or so "Micros" (some desirable), a new *Geometer* (carpet), and the following species of *Noctuidæ*: *Rhynchagrotis placida*, *Agrotis saucia* and *ypsilon*, *Noctua fennica* (very worn), *Feltia venerabilis* (sev.), *Carneades tessellata*, *Anytus sculptus* (a beauty), *Hadena mactata*, *Hillia algens* (several nice examples), *Nephelodes minians* (worn), *Hydræcia nictitans*, *Caradrina extimia*, *Nonagria* sp. (1, not yet named), *Cosmia infumata* (sev.), *Orthosia*

ferruginoides and euroa, *Xanthia togata*, *Cirrœdia pampina*, *Litholomia napæa* (some beauties), *Lithomia germana*, and *Calocampa nupera*, *cine-ritia* and *curvimacula*.

Sept. 1st: I commenced the month by adding three species to my collection: *Carneades velleripennis* (a pair), *Hydræcia obliqua* (1) and *Xylina capax* (a pair). A specimen of *Plusia Putnami* gave me a surprise; it was very fresh, but small.

Sept. 16th: Besides some common species, I noted this evening the capture of *Gleba inulta*, *Hydræcia sera*, *Xanthia togata*, *Litholomia napæa*, and *Xylina Georgii* and *laticinerea*. *Hadena devastatrix* and *Drasteria erechtea* turned up again, very fresh specimens.

My last records are:

Sept. 21st: *Hydræcia cerina* (1; new to list).

Sept. 23rd: A very small specimen of *Agrotis saucia*, and a worn *Feltia subguthica*.

Sept. 24th: *Orgyia leucostigma* and *Leucania juncicola* (one each).

Some evenings early in the month water beetles, and especially a small water "bug," were abundant at light. I generally used an ordinary lamp with a good-sized burner; sometimes a "Wanzer" lamp, and on a few occasions I had the two lit at the same time; both lamps had shades. The trouble with the "Wanzer" was that things often got into the flame, and now and then succeeded in putting it out, or making it smoke badly. My custom was towards dusk to light the lamp and put it on the edge of a table close to the window—which I had wide open—leaving a little space between the tablecloth and the window sill; (lots of things flew or dropped down on the floor which would otherwise have sneaked out of the window). I tried the window sill for the lamp, but found there was often too much wind for it there, and on rainy nights that position was out of the question. The house being a new one, the walls of my room are not papered, so that the moths when they rested there were very conspicuous, and it was possible to tell at a glance, in most cases, what they were; whether *Bombyces*, *Plusias*, *Geometers*, etc., and to select the most desirable first.

I used a net as seldom as possible, for fear of overturning the lamp, and also because—I think it was on the second evening of my venture—I caught the end of a setting-board with my net, and sent it flying from a high shelf to the floor, to the destruction of its contents and the loss of my temper. It was only sometimes for the *Sphingidæ* that I found a net was necessary. Besides two large glass bottles or jars (charged with cyanide,

of course), I had three or four small ones in use, with which I did most of the capturing, bottling from off the lamp shade, the table, walls, etc. It was often necessary to put these bottles over some good thing sitting on the floor, the window sill, or the shelves of my bookcase, and to have that number in constant use. As soon as the specimen covered or bottled was quiet, it was transferred to one of the large bottles, and the small one was ready for use again. I found it desirable to take up my carpet, owing to the quantity of insects that came in in July, and which littered the floor; often trodden under foot during the evening (some good things came to grief in this way), or succumbing to the dry heat of the room during the night or following day. I had to make "sweeps" of the slain occasionally, they made such a mess; an examination of the dustpan before consignment of its contents to the fire, sometimes revealed some specimen worth keeping; it was in this way that I secured two out of the four specimens taken of *Tapinostola variana*. On some evenings I think all the mosquitoes of the neighbourhood found their way in at my window, and assisted in making things lively for me; and the number of things flying about the room, or dashing around the lamp, was quite bewildering, and not conducive to coolness. Besides these pests (the mosquitoes) several species of Ichneumonidæ put in an appearance, on some evenings in numbers; and while they did not seem to be attracted to the lamp particularly, they kept on the move about the room, making considerable noise on the walls and ceiling. Perhaps the worst visitors of all were some of the large Dytiscidæ and *Lachnosterna fusca*. In September several kinds of water-flies came to the light in numbers.

Some peculiarities of this mode of collecting were noticed, and may be worth mentioning. One thing I observed particularly, when I put in a good long evening at it, was the occasional lull, of greater or lesser duration, when hardly anything seemed to be moving outside, judging by the scarcity of things coming in; then all of a sudden a fresh lot, of all kinds and conditions, would come swarming about the lamp. Some nights there would be a succession of the same species, one after the other, for a short time, as if they had been playing at "Follow my leader," and then not another would be seen that night. Again, a species would come in one evening in fair numbers, and then never show up again; others just one or two only in the same way. Two most striking examples of the latter were *Ianassa lignicolor* and *Noctua plecta*; in both cases three specimens were taken within a few minutes, and no others were seen on that or other evenings. Other species, again, appeared to occur in about

the same numbers on favourable or poor nights, and in some cases were on the wing for nearly a month. Some nights nothing was moving until much later than usual, and I had been on the point of "closing up" for the evening—my patience being exhausted—when some things would come along amply repaying me for the previous barrenness. There was quite a difference, too, in the way in which the light appeared to affect different species; some would dash around the lamp until they got their wings singed; others would fly in and sit down quietly on the table, as if inviting capture; some seemed only anxious to get out of the glare, and would settle quietly on the floor or the hanging tablecloth; some (chiefly Noctuids) could not make themselves scarce quickly enough, which they did by getting behind the cases, books, or on my shelves, and staying there; others were very restless and kept on the move until captured. In some few cases it appeared as if my visitors had but looked in to make an inspection, for after a turn or two about the room or lamp, they beat a retreat in a very businesslike manner; but I also noticed that some things which came dashing in, when they retraced their steps (?) did so with a very sober or hesitating flight, as if not sure of their way. As a rule, the Bombycidae, Plusiæ, and Geometridæ behaved very well, not being very wild, and they soon sought resting places on the walls, etc., seldom attempting to secrete themselves.

Besides the moths taken at light on the evening in which they came into my room, I usually had another good catch the following morning, and took more specimens again about dusk the next evening. On quitting work, or rather pleasure, for the evening, I would first close my window, leaving the blind half up, then put out the light and retire, carefully shutting the door. In the morning nearly everything in the way of "Micros," Geometers and Bombyces—also any Plusias overlooked the previous evening—would be found congregated on and about the window, on the blind or table cloth. (On July 2nd one of my captures in this way was a beautiful thing, and the only one seen, *Dasypoudæa Meadii*.) The Noctuids generally appropriated the holes and corners, but the majority of them did not show themselves in the morning. After picking and choosing what I wanted, I opened the window and freed the rest. I put on the fly blind to ventilate the room, keep out the flies, and keep in any moths still there. Towards dusk the Noctuids, which had hidden themselves during the daylight, would come from their retreats and they were easily bottled off the window or fly blind, where they gathered.

Sometimes I would get quite a number and variety from behind coats, etc., hanging on my door; a shake would often disturb half a dozen moths from the same garment.

After the Bombycidæ, my greatest success was with the Plusias. I am not certain whether more *æreoides* came to light than *striatella*. I did not bother much about the former; but my records of the latter show the taking of sixty specimens, of which nearly fifty were perfect. It was on the wing for about a month. The next in abundance was *Putnami*, and *ampla* was fairly common for about a week. Only one *simplex* came to light.

A few more observations, and I have done.

There is no doubt that, owing to the heavy rainfall during July, unusual for this climate, I had a much larger percentage of good or suitable evenings than would be the case in average years.

Another circumstance, perhaps accounting for the abundance of moths about during July, may have been the unusually heavy snowfall of the previous winter. The snow came at the end of October; during November it may be said to have snowed, more or less, every day, and there were no thaws to speak of during the winter to expose or uncover the earth. In the spring the snow disappeared very quickly, its departure being hastened by some heavy rains.

The weather during April and the early part of May was favourable to the development of vegetation and insect life. The end of May and the beginning of June, however, were on the cool side, and there were frosts on several nights. I hope, for the sake of comparison, that I may have the chance to collect here "at light" again next season.

SOME INSECTS, RARE IN CANADA, TAKEN AT HAMILTON BY MR. JAMES JOHNSTON.

Having some correspondence with Mr. Johnston, he, anticipating the interest I naturally felt in the entomology of my former residence, informed me of some things he had taken at Hamilton which were not to be got when I was a collector there; and they seemed to me to be of so much general interest that I desired him to make a note of them for publication. So, complying with my request, he has prepared the accompanying more extended statement on the subject. What a rapid change is taking place in the condition of the country! All my familiar and delightful hunting-grounds in that locality have been "improved out of existence." With cultivation comes a change in the flora, which produces

a change in the fauna, and in the insect fauna especially. So that future collectors will be able to form no correct idea of what was to be got by what is to be had. A thought that greatly impressed me was the persistent effort that insects are continually making to spread abroad and establish themselves in fresh territory. Most of these southern butterflies seem to have great difficulty in accommodating themselves to our shorter seasons. In the case of *Colias casonia* there should be no trouble about food-plants, as one of these is *Trifolium*; but in the south-west it is double-brooded, and it may perish in the attempt to produce a second brood in this latitude, and it may take many years to bring it into harmony with its environment here.

In his catalogue of 1877, Mr. W. H. Edwards gives its habitat as Southern States, Mississippi Valley, Kansas, Texas, Arizona. And in 1888, CAN. ENT., Vol. XX., page 23, he says: "*Casonia* is a common butterfly in the Mississippi Valley and Gulf States; also in Southern California, and to the Isthmus." Then he adds: "I myself have never seen it on the wing." What an extent of territory it must have covered in the last ten years! It would be interesting to know the routes it has taken. The first Canadian examples of it that I saw were taken at Long Point, Lake Erie, twenty years ago or so. I also have not yet seen it on the wing.

The locality where I took my *Pamphila dion* was in a marsh at the west end of the city. The Rifle Club had its ranges on a piece of waste land there; and for convenience to reach the butts had constructed a board walk through an arm of the marsh, which was full of water and covered with cat-tail flags. Two clumps of a large flowering plant grew beside that board walk; the butterflies and the blossoms appeared together about the 1st of July, and from these blossoms I took all my *P. dion*. When the Rifle Range was moved to another locality that board walk was abolished, and from that time on I got no more specimens of *dion*. I was pleased to learn that Mr. Johnston had rediscovered it. I have not heard of its being taken anywhere else in Canada. I had been taking it for several years before I got its name. Specimens of it were given to the Canadian collection that went to the Centennial Exhibition at Philadelphia, and a promise made that its name should be procured. I got tired waiting, and sent specimens of it to Mr. W. H. Edwards, to find that it had been named only a few months previously from material obtained elsewhere. (CAN. ENT., Vol. XI., p. 238.)

Saperda candida had not been seen about Hamilton in my time.

J. ALSTON MOFFAT.

During the years of my collecting, 1896 leads in presenting rare

insects to this locality. Besides some Coleoptera and Lepidoptera not yet satisfactorily determined, the following species were taken :

COLEOPTERA.

Saperda concolor, L.ec.—Several dozen last week in May and first in June.
On Swamp Willow.

Saperda candida, Fab.—Thirty specimens, June 4th and some days later.
Found on Thorn when hunting for *S. Fayi*.

DIURNALS.

Nisoniades proprius, Scud —One, May 26th. On roadside. Differs only from one labeled British Columbia in my collection by being a finer specimen.

Papilio marcellus, Cram.—One June 4th, and one before and after that date. On Clover.

Libythea Bachmani, Kirt —One, June 4th. Saw another later on. On Poison Ivy.

Colias cæsonia, Stoll.—Twelve good and several poor specimens. First taken June 14th. Quite abundant until the end of the month. First saw it June 7th, but finding it very wild did not succeed in capturing a specimen until the 14th, when I took six. Last taken July 1st. Was most abundant on line of Grand Trunk Railway, between Hamilton and Stony Creek. Saw it on Toronto branch of same railway near Waterdown when out after *Phyciodes Batesii*, Reak., June 20th, but not so abundant.

Pamphila dion, Ed.—Seven, July 1st and following week. I have found this species not so fond of feeding as other Pamphilas. It seems to like to sit resting on the coarse swamp grass in damp places along the railway.

Satyryx alope, F.—One, fine, July 9th. On side of railway track, amongst weeds.

Junonia cænia, Hub.—One, August 27th. Almost dead on roadside.

MOTHS.

Sphinx luscitiosa, Clem.—One, May 28th. Just fully matured, hanging to a weed near railway track.

Endropia serrata, Drury.—Five, July 15th. Amongst weeds on side of railway track.

I was in hopes of at least some of these reappearing in 1897, but in this I was disappointed, as not one of them was seen.

I did not do much hunting outside the farm on which I live, four

miles east from Hamilton, this year. Amongst the greatest pests that we had to contend with were the potato beetles (*Doryphora 10-lineata*, Say). Out of 8,000 tomato plants set out during the first week in June, fully 2,000 were destroyed by these beetles within four days. We came across some plants having as many as eighteen beetles on them. We have not hitherto been annoyed by their attacking our tomato plants to a very great extent, and can only account for their ravages this season owing to a slim crop of early potatoes in this neighborhood, the late ones not yet being above ground.

The Tomato Moth grubs (*Sphinx quinquemaculata*) were also very abundant and could have been had by the hundred. It appears that they have other enemies than Ichneumons, as I came across dozens of empty chrysalids, when picking the fruit in September, which had been rooted out and devoured by some animals, possibly skunks, certainly not mice, judging from the excrement lying about.

Terias lisa, Bd.—One, July 4th. The only rarity taken this season.

JAMES JOHNSTON, Hamilton, Ont.

THE LABELING OF ENTOMOLOGICAL SPECIMENS.

BY CHARLES STEVENSON, MONTREAL.

During a visit to Great Britain a few years ago I looked over a number of the Entomological collections in the public Museums there. The specimens in them were labeled so as to show the order, sub-order, and family that they belonged to and their individual scientific names. With few exceptions there were no records of their geographical distribution, and when information of habitation was given it was of a wide nature, as North America, Asia, or Europe. Data of seasonal appearance, or date of capture were entirely absent. Since then I have found that many collections on this side of the Atlantic are in the same condition, and private collections in particular. That such information should be wanting, especially in a public collection, is to be regretted; for however beautifully mounted, classified and correctly named the specimens may be, they are of little practical value. The biological student gets no more information than he would from any entomological publication containing plates, unless it be the identification of some rare insect. The reason that public collections are lacking in such data is because they have been built up from donations or by purchase — and until recent years the study of insects rarely consisted of more than collecting, mount-

ing, naming, and placing in classified order. This can be remedied by the present-day collector, professional or amateur. It seems strange that a method of labeling similar to what I shall illustrate has not become more general. On hunting up bibliographic references on the subject in my own library I found little instruction. In *The Entomologist's Useful Companion*, by Geo. Samouelle, London, 1819, the author directs that each specimen shall have a number corresponding with that of a catalogue having an account of the place where found, time of appearance, etc. The *Report of the Commissioner of Agriculture, U.S.A., for 1868*, contained an article on *Practical Entomology for Farmers' Sons*, recommending the same method, with the improvement of having the numbers on coloured disks; the different States or localities being represented by a certain colour. These methods are unsatisfactory, as they show nothing without the catalogue, and when a collection leaves the original owner's possession it is often divided up, and the catalogue is lost sight of. It is surprising that among the many handbooks and guides published there is so little mentioned on this subject. Even that indispensable work, *Entomology for Beginners*, by A. S. Packard, M. D., Ph. D., New York, 1890, recommends only the coloured number disks. The most satisfactory directions are those of Samuel H. Scudder in his *Butterflies, their Structure, Changes and Life Histories*, New York, 1889, namely: "Every pinned specimen, excepting such as illustrate anatomy only, should bear upon the pin a label giving the place and date of capture, and when necessary a number referring to a catalogue or notebook in which memoranda may be entered to any extent that may be desired." In other words, these particulars become part and parcel of the specimen, so that whenever the insect or object is moved, its history goes with it. In this way the collector makes his collection an index to his outdoor observation and study, and on leaving his possession will be of great interest as well as value to the next owner.

Each collector can devise a form of label for such purpose to suit his own taste as well as convenience. Disks of stiff paper the size of a ten cent piece make neat labels for those who write a small hand. On these, I put the catalogue reference number, the locality where found, the date of capture, and sometimes the distinction of sex, by using the usual astronomical signs in general use, namely, that of Mars ♂ for the male and of Venus ♀ for the female and the sign ♀ for the neuter or worker. By having different coloured paper for each locality, one can see at once all those belonging to the same district in a case.

The pin on which the specimen is fixed is passed through the centre of this disk, so as to allow it to rest about an eighth of an inch from the bottom of the drawer or case. This would not be practical in the low-setting method, to which many British entomologists still adhere—a method which should be condemned as putting the insect in easy reach of parasites and being an exhibition more of pins than of insects.

All this will make considerable extra labour, but will, after a time, be found well worth it; for the collector himself often forgets where or when he got a certain specimen. The name label could be made more interesting to non-entomologists by having the common local name, where known, under the scientific one, and would tend to make the study of insect life more popular.



A NEW SPECIES OF AEGIALITES.

BY THE LATE M. L. LINELL, WASHINGTON, D. C.

During his visit in 1896 to Robben Island, a low rock only 2,000 feet long, situated near the eastern coast of Sakhalin Island, in Okhotsk Sea, Dr. Leonhard Stejneger collected only two species of insects, both Coleoptera. One of them is a species of *Bembidium*, possibly new, but it should be compared with the numerous species from the mainland, which cannot be done at present. The other species belongs to the highly interesting genus *Aegialites*, and is described below as a new species.

Aegialites Stejnegeri, Linell, new species.

Elongate, convex, piceous; upper surface with faint greenish lustre. Antennæ piceous, abruptly clavate. Head broad, finely coriaceous and sparsely punctate. Eyes strongly prominent, very coarsely granulate. Thorax very narrow, distinctly longer than wide, a little broader at base than at apex, widest in front of middle; sides slightly arcuate; disc coriaceous, very sparsely and irregularly punctate, the median line impressed and a shallow fovea on each side. Elytra very short and ovate, abruptly and broadly pedunculate at the humeri, strongly rounded on the sides and very much wider behind the middle, the apices separately, strongly rounded; disc finely rugose, the striæ narrow, scarcely impressed, with small but distinct punctures, entirely effaced at apex. Pygidium and propygidium exposed. Prosternum smooth, meso- and metasternum vaguely rugose, side-pieces sparsely coarsely punctate. Abdomen cori-

aceous, nearly impunctate. Legs piceous, femora more or less testaceous.

Male.—Median and posterior tibiæ abruptly bent near the apex (as in the other species of the genus).* Length, 4 mm., male a little smaller.

Type No. 1390, U. S. N. M.

Five examples collected (Aug. 31, 1896) by Mr. L. Stejneger on Robben Island, Okhotsk Sea.

Intermediate in size between the two previously described species, and very distinct in form and sculpture.

BOOK NOTICE.

SCUDDER'S REVISION OF THE MELANOPLI.

One of the most important works on Entomology which has been issued by an American author in recent years is that entitled a "Revision of the Orthopteran Group Melanopli (Acrididæ), with special reference to North American Forms," by Samuel Hubbard Scudder † It is the more important because it deals with a representative North American group of insects whose members, between April and November, leap from our pathway in profusion whether we stroll through open woodland, sunny meadow, or along the roadside, and yet of whose classification and nomenclature the greatest confusion has heretofore existed. It was only another example showing the truth of the old saying that "the common things about us are those of which we are most densely ignorant."

True, of one of the members of the group, the "Rocky Mountain Locust," *Melanoplus spretus* (Thos.), more has, perhaps, been written than of any other insect on earth, yet it is but one of 207 of its kind which are described at length by Mr. Scudder. The others are scattered far and wide over the continent of North America, and the descriptions of the 92 species hitherto rightfully known to science were distributed through an almost equal range of literature. No better evidence of the need of the "Revision" is necessary than to know that after a careful examination of nearly 8,000 specimens, 7,000 of which belonged to the single genus *Melanoplus*, the author has in it reduced 47 supposed species to synonyms and has established 18 new genera and described for the first time 115 species.

With a group whose members are so closely akin as those of the

*Dr. Horn, while describing *A. Fuchsii* (Trans. Am. Ent. Soc., 1893, Vol. XX., p. 143), evidently did not have the male before him.

†Proc. U. S. Nat. Mus., XX., 1897, No. 1124, pp. 1-421. Plates I.-XXVI.

Melanopli it has heretofore been almost an impossibility for the specialist—let alone the tyro—to satisfy his conscience as to the status of a specimen which he might have in hand. The available literature was so scattered, and the different authors had seized upon so many different characters as representing what appeared to them the most striking structural features, that the whole mess was worse than a Chinese puzzle. By seizing upon the variations of the abdominal appendages of the male as the most salient features showing specific rank, and by publishing accurate drawings of two different views of the male abdomen of each of the 207 species, Mr. Scudder has done much to render possible the ready identification of each species—a task which otherwise would have been very difficult, owing to the size of the group and the close similarity of many of its members. Analytical keys to genera, and to species where the genus is not monotypic, are also given, and add much to the value of the work, as does also the full list of localities from which each species has heretofore been taken.

Taking into consideration its size and importance, the defects of the "Revision" are very few. The one thing which the tyro will find most lacking is a glossary of the technical terms. In a work of the kind these are necessarily numerous, and though they may be very plain to the author and to specialists, to the beginner they are often extremely confusing. Even a figure of a typical locust with all the parts named would have been a great aid. A tendency to multiply species can here and there be noted, as on p. 138, where *M. bivittatus* is separated from *M. femoratus* only by the colour of the hind tibiæ, which is an exceedingly variable character.

More might have been added along economical lines, but this is a work for the future which the student of the group can now take up with renewed energy. For before one can write of a species he must have a name to handle it by; something which in the case of many of the members of this group has heretofore been lacking. Now, by using a little care and accustoming himself to the technical terms, the student can, by the aid of the "Revision," soon bring order out of chaos, and label his Melanopli with correctness and dispatch. In conclusion, it may be said that any one who will use the work will soon conclude that the aim of the author, "to enlarge and systematize our knowledge of this important group as a basis for future studies," has been well and successfully accomplished.

W. S. B.

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No. 4.

PROFESSOR J. HOYES PANTON, M. A., F. G. S.

It is our sad duty to record the death of Professor Panton, which took place at Guelph, on the 2nd of February, after a long and very painful illness, which he bore with the utmost patience and resignation. He was born at Cupar, in Fifeshire, Scotland, and was brought out to Canada when a child; his father settled in Toronto at first, and removed, after some years, to Oshawa. He was educated at the Whitby High School and Toronto University, where he graduated with honours in Natural Science in 1877. The following year he was appointed Professor of Chemistry in the Ontario Agricultural College, but after a few years resigned the position and removed to Winnipeg, where he became principal of the Collegiate Institute. In 1885 he accepted the invitation of the Ontario Government and returned to Guelph, where he filled the position of Professor of Natural History and Geology in the Agricultural College till the time of his death. His work there had special relation to economic entomology and botany, on which subjects he issued many useful bulletins to farmers and fruit-growers. He also published two small works on Economic Geology and "Insect Foes," which are valuable manuals of an elementary character. In 1896 Professor Panton attended for the first time the annual meeting of the Entomological Society of Ontario, though he had long been a member, and on that occasion read very interesting and useful papers on "Entomology for Rural Schools" and "Two Insect Pests of 1896—the Army Worm and the Tussock Moth." At the recent annual meeting in October, 1897, he was elected vice-president of the Society, but was unable to attend owing to the illness which had already seized upon him. The following resolution of condolence was adopted at a meeting of the Council held last month: "The members of the Council of the Entomological Society of Ontario have heard with profound regret of the death of their highly respected colleague and vice-president, J. Hoyes Panton, M. A., F. G. S., Professor of Biology and Geology in the Ontario Agricultural College, Guelph. They desire to place on record their admiration for his talents and attainments in natural

science, and their deep sense of the loss which economic entomology in this Province has sustained by his removal in the maturity of his powers and at an age when he was capable of performing much useful work. They beg to offer to Mrs. Panton and family their respectful sympathy in the great bereavement which has befallen them."

SOME RECENT ADDITIONS TO THE INSECT FAUNA OF OHIO.*

BY F. M. WEBSTER, WOOSTER, OHIO.

In the year 1889, Mr. Henry Tryon, Assistant Curator of the Queensland, Australia, Museum, in a report on the insect and fungus pests, published as report No. 1, by the Department of Agriculture of Queensland, pp. 89-91, describes a species of scale insect found on the

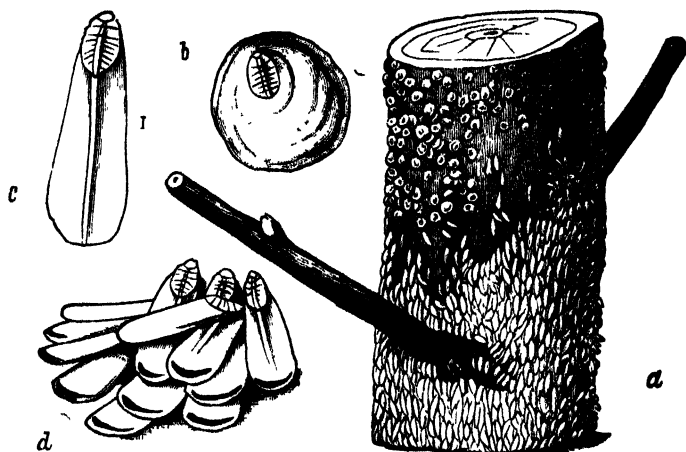


FIG. 7.—*Diaspis amygdali*, Tryon: a, branch covered with male and female scales, natural size; b, female scale; c, male scale; d, group of male scales, enlarged. (After Howard.)

peach, as the White Scale, *Diaspis amygdali* (fig. 7), and reported its occurrence both at Brisbane, Queensland, and Sydney, New South Wales. Although described as the White Scale, the author continually refers to it as the peach scale, in his paper, and the latter name has been adopted in America for the species. Of its habits Mr. Tryon states that: "At first its presence is betrayed by small white spots or patches on the bark of the smaller branches; but as the insect increases these soon become

* Read before the Ohio State Academy of Science, December 29, 1897.

in many places confluent, and the individual scales overlap one another, or are contorted by being squeezed together closely, or even appear to lie one over the other, and where the male scale insects crowd together these spots present a more finely chaffy appearance. As it will occur quite up to the tips of the branches, the complete destruction of any tree subjected to the attack of the peach scale, and owing to it, is only a matter of time. When already in patches on the branchlets prior to the formation of the leaves and fruit, in early spring, it does not hinder their formation; the leaves are green as usual, the fruit sets, but is soon retarded in its growth and shrivels up." Writing me under date of November 7th, 1897, however, Mr. Tryon has this to say of its present condition in Queensland: "This Coccid is far from being generally distributed in Queensland, and nowhere have I observed it to act very prejudicially to the trees that it attacks."

In March, 1897, a consignment of Japan Flowering Cherry, both the single and double varieties, was received direct from Japan by the importers in Ohio. A few months later, it was discovered that some of the double flowering variety were infested by a species of scale insect, which proved to belong to this species, and which had not before been known in Ohio. A thorough spraying with kerosene emulsion did nothing more than to check its increase, and did not exterminate it. (It has since been found on *Prunus pandula* and *P. pseudo-ceraceus*, also recently from Japan.)

The distribution of *Diaspis amygdali* and its food plants are also of interest. Mr. T. D. A. Cockerell has given an extended list of the food plants of the species*, and others have since been reported. It is now known to attack *Hibiscus (Abelmoschus) esculentus*, L., and *Gossypium barbadense*, or Jamaica cotton, about Kingston, Jamaica. Cultivated Pelargoniums; the grapevine†, dwarf peach and cherry‡ (cited as *Diaspis amygdali*, Putnam, in Proc., but correctly in CAN. ENT.), on *Bryophyllum calycinum*; *Carica papaya*; Persimmon; *Jassium*, in Jamaica; Oleander; *Calotropis procera*, *Capsicum*, *Argyria speciosa* when under cultivation in Jamaica, also *Acanthus*, and *Cycus media*. Mr. E. E. Green found it on *Callicarpa lanata* and *Tylophora asth-*

*Food Plants of Scale Insects (Coccidae), by T. D. A. Cockerell, Proc. U. S. Nat. Mus., Vol. XIX., pp. 725-785, No. 1122.

†Townsend, Jour. Inst. Jamaica, 1893, pp. 283, 378.

‡Cockerell, CAN. ENT., 1895, p. 260.

matica, at Punduloya, India *, and Mr. W. M. Maskell received it on Geranium from Hong Kong †. Mr. D. W. Coquillett found it at Los Angeles, California, on dwarf flowering almond, recently imported from Japan ‡, and the case on dwarf peach and cherry, previously noted, also occurred on trees from Japan. Dr. L. O. Howard reported it some years ago as occurring in an orchard at Molino, Florida, and in another orchard at Bainbridge, Georgia. It was first discovered in this country on some seedling peach trees on the grounds of the Department of Agriculture, at Washington, in 1892. Besides inhabiting Jamaica, it is also found in Trinidad, Martinique, Grand Cayman, Barbadoes and San Domingo.§

Under the caption of "The White Peach Scale," Mr. Charles P. Lounsbury, Government Entomologist for Cape Colony, South Africa, includes the species as one of the insect pests of that Colony. He gives the Fiji Islands as an additional habitat, and states that there is no doubt but that it has been in South Africa for at least fifteen years, and good reasons for believing it to have been there double that length of time. Mr. Lounsbury characterizes the insect as a highly injurious one, the favourite food plants of which are the peach and mulberry, the apricot and plum being severely attacked and sometimes killed, the cherry being liable to be severely attacked, while the pear has been slightly infested. *Myoporum insulare*, Yellow Jessamine, *Jasminum* sp. ? Granadilla, *Passiflora edulis*, *Polygala myrtifolia*, Morning Glory, *Ipomæa* sp. ? Fuchsias and Geraniums all may become very badly infested, while the Cape Gooseberry and other Solanaceous plants suffer to a less degree.||

Four species of Lady beetles and a Chalcid fly, the latter apparently identical with *Aspidiotophagus citrinus*, Craw., attack the species in Africa. None of these parasites, however, seem powerful enough to hold the scale insect in check.

In October two of the most seriously infested of the trees imported from Japan into Ohio were dug and transplanted to the Insectary of the Experiment Station at Wooster, and one of them enclosed in a breeding cage. Early in December a very minute parasite was reared, and the

* Indian Museum Notes, Vol. IV., p. 4, 1895.

† Trans. New Zealand Inst., 1896, p. 299.

‡ Insect Life, VI., p. 290.

§ Year Book of the U. S. Dept. Agr., 1894, pp. 265-267.

|| Report of the Government Entomologist for the year 1896, Cape of Good Hope, pp. 76-83.

females were observed in the act of ovipositing in the bodies of the scales on the tree. On these parasites being referred to Dr. L. O. Howard, of the United States Department of Agriculture, he at once pronounced the species as belonging to both a new genus and species, he having previously drawn up a manuscript description from species reared in Paris, France, by Dr. Paul Marchal, who had reared it from *Diaspis ostreaeformis*. It has since been discovered that the same insect was reared in Ceylon by E. E. Green, from *Chionaspis vitis*, and it has also been reared from a species of *Aspidiotus* on sweet gum from Savannah, Georgia. The species will now be known as *Archenomus bicolor*, Howard, the description having appeared in the Proc. Ent. Soc., Washington, Vol. IV., No. 2., page 136. There can hardly be a doubt but that this parasite was imported with its host from Japan, and well illustrates the wide distribution of insects, both injurious and beneficial, in articles of commerce. Both the scale insect and its parasite are new to Ohio. While it is almost impossible to determine the native home of *Diaspis amygdali* at the present time, it is likely that this honour will fall either upon Japan or the West Indies, though it might have been first diffused from the East Indies. That the little parasite, *Archenomus bicolor*, Howard, should be reared at such widely separated points as Paris, France; Ceylon; Savannah, Georgia; and Wooster, Ohio, with the probability of the species having been imported into Ohio from Japan, is somewhat surprising, and well illustrates the almost universal diffusion of some of our parasitic insects.

Another scale insect, probably new to Ohio, is the apricot scale, *Lecanium armeniacum*, Craw. I have not been able to find any record of the occurrence of this insect outside of California, where it is found on the apricot, prune and plum especially, but also occurring on the cherry and pear.* My specimens, which seem to be a variety, were found on the Spanish Chestnut, in great abundance.

*California State Board of Horticulture, Division of Entomology. Destructive Insects, Their Natural Enemies, Remedies and Recommendations. By Alexander Craw, Quarantine Officer and Entomologist, Sacramento, California, 1891, pp. 12-13.

GENUS EUSCHAUSIA.

Schausia, Dyar (Arctiidæ), CAN. ENT., XXIX, 212 (1897), is preoccupied by *Schausia*, Karsch (Agaristidæ), Entom. Nach., XXI., 346 (1895). The Arctiid genus may be called *Euschausia*.

HARRISON G. DYAR.

NOTES ON THE EXTERNAL CHARACTERS OF THE SAN JOSE SCALE, CHERRY SCALE, AND PUTNAM'S SCALE.

BY W. G. JOHNSON, COLLEGE PARK, MARYLAND.

March 14th, 1898.—During the last two or three weeks, I have received inquiries from Georgia, Iowa, Kansas, and Canada, regarding the structural external characters of the San José scale (*Aspidiotus perniciosus*), Cherry scale (*A. Forbesi*), and Putnam's scale (*A. ancylus*). I present, therefore, a few notes on these species, which I hope may be of some use to my fellow workers.

It is not a very difficult matter at this time of the year to separate these species at a glance. As is well known, *perniciosus* winters as a partially matured insect, and when the insects are perfectly normal, they are almost always uniformly blackish, with the exuvæ or nipple-like prominences, very conspicuously surrounded by a circle, of the same general colour, as a rule, as the rest of the scale. Of course, on trees badly infested with this insect, there are always many scales of the old males, females, and young, which were not sufficiently covered to protect them at the time cold weather set in; but where a sufficient number of young in good condition can be found, the above character does not vary much, and rarely, if ever, are the pupæ of the males to be found at this time of the year.

Forbesi also winters in a partially matured condition, but male pupæ are conspicuously present at this season, or even very much earlier. The colour of the scales varies considerably, but usually conforms somewhat to the colour of the bark. The nipple-like prominence is very conspicuous and is of an orange, brick-red or purplish tinge. The exuvæ are usually covered with a delicate film or membrane of rather light colour, but are ruptured in most cases, exposing the bright coloured centres. The scales of the males and females are not uniform in colour, being much lighter around the border of the young female and at the caudal end of the male scale. The conspicuousness of the exuvæ and the presence of the pupæ at this time of the year are characters which almost always distinguish this species from *perniciosus*.

The female of *ancylus*, in this location at this season, is much more developed than either of the foregoing species. The young females are usually not so convex as *perniciosus* or *Forbesi*. The exuvæ are lighter than *perniciosus*, and not nearly so bright as in *Forbesi*, varying in

colour from amber to grayish. The general colour of the scale varies also from nearly black to a grayish tinge, depending largely upon the plants upon which it is found. The scale is very delicate, more uniform in general colour, approaching *pernicius* nearer than it does *Forbesi* in this respect.

The structural characters of the mature females are very marked. In *pernicius*, the two pairs of anal lobes and the absence of spinnerets are very characteristic. In *ancylus*, while there are two pairs of lobes also, they are usually very broad and flattish, the second pair being widely separated from the first. The presence of the spinnerets is also a distinctive mark for this species, and if the lobes are carefully examined, this species need not be confounded with either *pernicius* or *Forbesi*. In *Forbesi*, the two pairs of anal lobes approach *pernicius* much more than they do *ancylus*, but *Forbesi* can be distinguished readily from *pernicius* by the presence of conspicuous thickenings of the body wall, forming club-shaped masses between the lobes. The spinnerets are always present, usually arranged in five groups in the mature female. In this connection, I might say that I have never seen spinnerets in any of the immature forms of either *ancylus* or *Forbesi*.

There are a few characters presented by the plant which will serve as a mark for identifying the species. On most of our deciduous fruit trees there is a purplish tinge formed about the scales of all three species on young succulent wood. This tinge varies considerably, and depends largely upon the trees, showing more plainly upon some varieties than upon others. With *pernicius* the purple extends into the bast, and on some very badly infested apple trees I have seen even the young tender wood coloured to bright carmine. I have also seen the fruit of peach badly spotted on account of the attacks of *pernicius*, and on some varieties the colour extended into the flesh, sometimes to a depth of a quarter of an inch. The purplish tinge caused by *ancylus* and *Forbesi* is usually not so marked as in *pernicius*. The bast is brightly coloured at times by both these species, but this does not occur as often as with *pernicius*.

Forbesi also causes a peculiar rough, pitted appearance upon peach and apple that is not usually produced by either *ancylus* or *pernicius*. The insect seems to retard the cellular growth of the plant immediately surrounding it, and it is not an uncommon thing to find isolated matured females in rather deep depressions. This character is especially prominent on apple and peach in the nursery.

COLLECTING AT LIGHT.

I have read with much interest a couple of papers by Mr. Hanham, of Winnipeg, on the capturing of insects "at light." I had adopted this method in the Old Country with much success, and last season in this district, near the head of Lake Manitoba, I employed the same means and secured a goodly number of specimens. There is no doubt that light is most efficacious in securing to the one who makes use of it many insects that would otherwise be only rarely met with, but while engaged in thus making captures one cannot help being struck—a point to which Mr. Hanham alludes—with the effect light has upon many of the Lepidoptera, or rather with the different effects it has upon different individuals. Now, it seems to me that a careful observation on the part of entomologists in this respect might in due time throw fresh "light" on the habits or even structure of the insects observed. *Why*, I may ask, should light have such a different effect upon insects of the same class? As there is a reason for everything, so there must be here. A casual observer may note that while light acts upon some individuals as an irresistible attraction, to others it is simply repellant, and in the case of others both these effects are combined. Then, again, some are evidently thrown into a kind of stupor under the effect of the glare, and settling down near the attractive force, remain immovable for hours; while yet again others are frantic in their struggles to reach the source of their fascination. This difference of effect, while it points to a dissimilarity of temperament, would seem to indicate a difference of structure, if anywhere, in the eye. Is this known to be a fact; or, if this be not the case, in what does it consist? It seems to me that here is a wide field for investigation, and it might not be lost labour if, during the coming season, those entomologists who adopt light as a means of capture would, as far as possible, classify the insects taken in regard to the effect the light has upon them.

I may say that when using light, I place it before a closed window on the ground floor, and stand outside, and with a net I am able to capture many insects which do not apparently ever settle on the glass, but simply approach within range of the light and then fly away rapidly at an angle, acting much in the same manner as a comet is said to do in regard to the sun.

H. HUTCHINSON, Kinosota, Manitoba.

ERRATUM.

CAN. ENT., 1898, p. 15, line 8, for "*not* commonly" read "*most* commonly."

NEW SPECIES OF CHIONASPIS AND NOTES ON
PREVIOUSLY KNOWN SPECIES.

BY R. A. COOLEY, B. S., AMHERST, MASS.

In the CANADIAN ENTOMOLOGIST, Vol. XXVII., page 33 (1895), Professor T. D. A. Cockerell stated that Dr. James Fletcher had just sent him a species of *Chionaspis* from Charlottetown, Prince Edward Island -- very abundant on the bark of *Betula papyrifera* -- and that in comparing it with Prof. Comstock's description of *C. Lintneri* he believed it to be that species. Following the description of the Prince Edward Island specimens, Prof. Cockerell drew attention to a few probable points of difference between it and Prof. Comstock's description, but as he could find no positive differences he did not separate the form on *Betula*, inferring that the discrepancy was due either to variation in his specimens or the incompleteness of Prof. Comstock's description. I have since received specimens of the form on *Betula papyrifera* from Prof. Comstock and Dr. J. A. Lintner, and the latter gentleman has also lent me Prof. Comstock's co-types of *C. Lintneri*. On comparing the two I was at once convinced that they were distinct, and upon giving Prof. Cockerell my reasons for thinking that the two insects could not be identical, he advised me to separate the form on *Betula*.

While the insect is distinct from *Lintneri*, Comst., I believe it to be only a variety of that species, and have described it as such below.

CHIONASPIS LINTNERI BETULÆ, n. var.

Scale of Female.—Widely pyriform, flat, covered with the very thin epidermis of the bark, giving a brownish tinge to the snow-white scale. Exuviae bright orange-brown, contrasting strongly with the secreted portion. Texture of scale compact. Length of exuviae about .8 mm.; total length of the scale about 2 mm.

Compared with typical *Lintneri*, the variety is .5 to 1 mm. shorter, proportionately broader, firmer in texture, with the exuviae orange-brown instead of yellowish-brown.

Scale of Male.—Of the normal form and colour of the genus, with a distinct but feeble median keel and pale yellow exuviae. Length about .8 mm.

Unfortunately I have no typical male scales of *Lintneri* with which to compare those of this variety.

Female.—Elongated, with the segmentation moderately distinct.

Pygidium with three pairs of lobes visible; median pair large and well developed, second pair smaller, third pair rudimentary. Median pair contiguous at the base, their inner edges diverging at about a right angle, each lobe being bluntly pointed. Lobes of the second pair each composed of two rounded lobules, of which the inner is the larger. Third pair only slightly produced. A distinct spine at the base of each median lobe, and a small plate and obscure marginal gland opening between the median and second lobes. A large spine above and a small one below the outer lobule of the second lobe. A plate and marginal gland opening between the second and third lobes. Following the third lobe, two spines, two plates, a marginal gland opening, and, after a space, a group of one to three plates, followed first by a marginal gland opening and then by a terminal group of five to nine plates. Dorsal rows of oval gland openings present.

Groups of circumgenital glands compact. Median, 13 to 18; anterior laterals, 25 to 42; posterior laterals, 19 to 28.

Male.—Unknown.

It is impossible to separate the two insects by their pygidia.

Chionaspis Lintneri, Comst., and this variety both belong to the group of *salicis* L., *ortholobis*, Comst.

CHIONASPIS CARYÆ, n. sp.

Scale of Female.—Inconspicuous on the bark of the host plant; elongated, rather irregular in form, of a dirty white colour with brown exuvæ. Anterior and smaller exuvia easily distinguished, the posterior and larger one completely hidden from view by the copious secretion that covers it. Length, 1.7 to 2. mm. Breadth, about .8 mm.

Scale of Male.—Very small and white, with a very indistinct median keel. The pale brown exuvia extending about one-third the total length. Length, .5 to .7 mm.

Female.—Elongated, narrowed toward the anterior end, being broadest toward the posterior end. Segmentation distinct, the posterior segments being produced laterally and bearing numerous gland openings. Rudimentary antennæ distinct, the distance between them about equal to the width of the mouth-parts. Pygidium brown, somewhat triangular, with the first and second pairs of lobes well developed, the third pair being more or less rudimentary. Median pair large, conspicuous, with their inner edges fused together for about half their length, forming one solid piece. Lobes of the second pair each divided into an inner,

oblique, lobule which is sometimes serrated, and an outer straight one, the inner one being larger. Third pair of lobes broad and only slightly produced, with the outer edge serrated. A distinct spine above at the base of each median lobe, and between the median and second lobes a short plate and an obscure marginal gland opening. A large spine above the outer lobule of the second lobe and a smaller one below, and between this lobule and the third lobe a plate and a marginal gland opening. A marginal gland opening at the base of the third lobe, and, outside this lobe, a large spine above and a small one below, followed first by a plate and then by a notch in which is a marginal gland opening. Following this is a spine, one or two plates, and, after a space, the terminal group of about seven plates. Dorsal rows of oval gland openings present.

Circumgenital glands arranged in five groups: Median, 12 to 19; anterior laterals, 21 to 29; posterior laterals, 15 to 22.

Male.—Unknown.

This species also belongs to the *salicis* group, but may be readily distinguished from all others of the genus by the peculiar fusion of the inner edges of the median lobes.

Habitat.—On *Carya* from Washington, D. C.

CHIONASPIS LOUNSBURYI, n. sp.

Scale of Female.—Elongated, sometime narrow like *Mytilaspis* and sometimes broadened posteriorly like *Chionaspis*; straight, very firm in texture, silvery-white with the exuviae yellowish or brownish. Secretion covering the second exuvia firm and persistent. Scale more or less covered with a brown bloom, which occurs naturally on the surface of the leaves of the host-plant. Length of exuviae about 1 mm.; total length, 2.4 to 3 mm.

Scale of Male.—Very loosely constructed and fragile; median keel present, but very indistinct, invisible, in fact, except in the more perfect specimens. White, with the exuvia pale yellowish or colourless. Length, 1.2 to 1.5 mm.

Female.—Elongated, narrowed at the anterior end, but with the abdominal segments of about equal width; mouth-parts occupying fully one-half the width of the body at the anterior end. Pygidium with a median notch, the two sides being formed by the first pair of lobes, which are large and well developed in some individuals, or small and rudimentary in others. Second pair present, third pair obsolete. Median lobes

when well developed rounded on the posterior extremities, sometimes faintly serrate, with a pair of spines in the notch; when rudimentary, only slightly produced, with the pair of spines in the notch often inconspicuous or absent. Second lobe composed of two lobules, inner large and rounded, outer smaller and bluntly pointed. Two spines anterior to the outer edge of each median lobe. A well-developed plate and a marginal gland opening between the median and second lobes. Two spines at the base of the second lobe, and outside this lobe, a second plate, followed by a deep notch in which is a marginal gland opening. Then two spines and a third plate followed by a second notch in which is a marginal gland opening, and, after a short space, the fourth and last plate. Dorsal rows of oval gland openings present.

Five groups of circumgenital glands: median, 5 or 6; anterior laterals, 10 to 13; posterior laterals, 13 to 27.

Male.—Unknown.

This species may be distinguished from other known members of the genus by the characteristic appearance of the scales, particularly those of the female. It belongs to the group of *eugeniæ* (Green), *chinensis* (Ckll.), etc., or those having a terminal median notch in the pygidium.

Habitat.—On an unidentified plant from Ceres, Cape Colony, South Africa, sent by the Government entomologist, Mr. Charles P. Lounsbury, to Dr. L. O. Howard, at Washington, and also to the writer. The female scales are indiscriminately distributed over both surfaces of the leaves, while the male scales occur in groups chiefly on the under surface.

I take pleasure in naming this insect after its discoverer, Mr. Lounsbury, who is doing very valuable and praiseworthy work in economic entomology.

CHIONASPIS HOWARDI, n. sp.

Scale of Female.—Elongated, narrow, sides nearly parallel. White, with the exuviae variable in colour, being yellow, brown or green; two parts of the same exuvia often of different colours. Second exuvia obscured by the waxy secretion that covers it. Length of exuviae about .7 mm.; total length of the scale, 1.5 to 1.7 mm.

Scale of Male.—Elongated, sides parallel, with a distinct median keel; creamy white with the exuvia of about the same colour. Length about 1.2 mm.

Female.—Elongated, very slightly broadened posteriorly, with the segmentation not pronounced, the posterior segments having numerous

gland openings on the sides. Pygidium cleft at intervals and having the margin distinctly denticulate, more plainly so in some specimens than in others. Median and second pairs of lobes well developed, often with thickenings of the body wall extending anteriorly from them; third pair wholly wanting. Median pair separated by a distance about equal to the width of one of the lobes. Each lobe of the second pair composed of two distinct and separate lobules, the inner one being larger and often approximating the median lobes in size. Interval between the median lobe occupied by two more or less distinct teeth, anterior to which is a transverse oval gland opening. Two spines anterior to each median lobe, and immediately outside each median lobe, a large plate, anterior to which is a spine. An oval gland opening between this plate and the second lobe, and, outside this lobe, a second plate, a denticulate space with two marginal gland openings and a spine, then one or two plates, followed by another denticulate space with two marginal gland openings and a spine, and, lastly, the terminal group of two plates.

Five groups of circumgenital glands; median, 5 to 7; anterior laterals, 9 to 14; posterior laterals, 7 to 14.

Male.—Unknown.

Habitat.—On East Indian bamboo from the Department of Agriculture, Washington, D. C.

I take pleasure in naming this insect after Dr. L. O. Howard, United States Entomologist, the extent and value of whose work is well known by all workers in entomology.

CHIONASPIS LINTNERI, Comst.

Since this species was described in 1882, in Prof. Comstock's second Report of the Department of Entomology of the Cornell University Experiment Station, no mention has been made of its having been discovered in other localities, except in the instance mentioned in a previous paragraph of this paper. On January 12, 1898, Mr. A. F. Burgess, an assistant in the scientific department of the work of extermination of the Gypsy moth, found a *Chionaspis* abundant on *Alnus* in a swamp in Stoneham, Mass. I made an examination of these specimens and found them to be *C. Lintneri*, Comst. The specimens occur only at the bases of the young trees.

CHIONASPIS MINOR, Mask.

In the fall of 1897, Prof. A. L. Quaintance sent me a piece of a branch of a "China-tree" (*Melia azedarach*) badly infested with a white

Chionaspis, which, on examination, proved to be *Chionaspis minor*, Mask. From the appearance of the branch, it occurred to me that the species might be doing harm, and, on writing to Prof. Quaintance, I was informed that it was severely attacking the "China-trees" at Braidentown, Florida, having apparently killed many trees on the main street of the town. This is the first time this species has been reported from the United States, so far as I can learn, and as it has quite a large number of food plants, its introduction is an important matter.

Chionaspis minor was originally described from New Zealand, and is quite generally distributed in the West Indies. Mr. Alexander Craw has also sent me specimens which arrived at San Francisco, Cal., on an unidentified plant from Panama. The species is known to attack Palm, *Vitis vinifera*, *Rhipogonum scandens*, *Persoonia*, *Hibiscus*, *Capsicum*, *Erythrina*, and *Melia azedarach* (China-tree).

A NEW GRASSHOPPER FROM ONTARIO.

BY E. M. WALKER, TORONTO.

Melanoplus abortivus, new species.—Size rather small, especially the male. Female nearly as large as *M. femur-rubrum*, but proportionately much stouter.

Frontal costa nearly reaching the clypeus, subequal, though sometimes a little contracted toward the vertex, plane except a slight depression at the ocellus, or in the male generally slightly sulcate from just above the ocellus, rather thinly punctate. Vertex with the margins slightly elevated, gently expanding in front of the eyes for a distance about equal to or somewhat less than that between the eyes in the female, rather greater in the male. Interspace between the eyes rather broader than the first antennal joint in the male, nearly twice as broad in the female. Eyes rather prominent, especially in the male, of moderate size. Top of head moderately prominent, evenly convex. Antennæ about as long as the head and pronotum. Anterior margin of pronotum truncate or very slightly emarginate, posterior margin obtusely rounded. Sides of pronotum in the male sub-parallel, only slightly divergent posteriorly on the metazona; in the female distinctly divergent throughout their entire length, so that the width of the pronotum is about one-third greater at the posterior than at the anterior margin. Dorsum of pronotum broadly convex and more or less distinctly and finely punctate on the metazona. Median carina entirely obliterated or very indistinct on the prozona, distinct and

somewhat elevated on the metazona. Lateral carinæ distinct except towards the posterior margin of the metazona. Posterior margin of the lateral lobes very oblique, forming an angle of about sixty degrees with the dorsum, more or less distinctly angulate with the sinuous lower margin; metazona densely punctate, prozona glabrous and shining. Prosternal spine short, bluntly conical, slightly bent backward, transverse in the female. Tegmina not longer than the pronotum, generally distinctly shorter, ovate in outline, the greatest breadth being about two-thirds the length; sometimes barely meeting on the dorsum, but more often separated by a space of variable width, which is occasionally equal to nearly half the greatest width of the tegmen. Wings reduced to mere scales which do not quite reach the tympanum. Cerci of the male not quite reaching to the tip of the supra-anal plate, simple, about two-thirds as broad at the base as long, tapering to a blunt rounded point, which is not or scarcely bent inwards, outer margin nearly straight, inner slightly sinuate; under surface slightly convex near the base. Supra-anal plate with a narrow median furrow and a broader one of about equal depth on each side; triangular in outline, with rounded sides; width at base about two-thirds the length. Furcula minute, not more than about one-sixth length of the supra-anal plate, about as broad as long, slightly approximate and somewhat constricted in the middle. Sub-genital plate narrow, elongate, entire, terminating in a blunt point. Hind femora stout, reaching beyond the tip of the abdomen in the male, not quite to the end as a rule in the female. Colour of dried specimens: Above, dull grayish-brown, somewhat paler on the abdomen in the female, more or less distinctly speckled with darker gray. A shining black band runs from the posterior border of the eye across the upper half of the lateral lobe of the pronotum and downward to the middle coxa, and also backward along the side of the abdomen, fading away near the last segment. It encloses an oblique whitish spot running from the base of the tegmen to the hind coxa. Below this black band the whole of the head and thorax is yellowish-white in well-preserved specimens, deeper yellow on the metasternum. There is also in the female generally a short whitish line along the lateral carina of the pronotum, which is sometimes continued downward and forward in an interrupted line across the black band. Venter pale yellow, darker in the female. Hind femora yellowish-brown, under surface reddish-yellow, crossed on both outer and inner surfaces by two oblique, more or less distinct, dusky bands. Hind tibiæ coral-red. Fore and

middle legs yellowish, fleeced with reddish-brown. Antennæ dusky paler at base.

Length of antenna: ♂ 5.5 to 7 mm., ♀ 6.8 to 7.5 mm.

“ “ head and pronotum: ♂ 6 to 7 mm., ♀ 6.8 to 8 mm.

“ “ hind femora: ♂ 9 to 9.5 mm., ♀ 10 to 12 mm.

“ “ tegmen: ♂ 3 to 3.5 mm., ♀ 3.5 to 5.5 mm.

“ “ body: ♂ 14.5 to 16.7, ♀ 20 to 24 mm.

This species is very closely allied to *M. mancus*, Smith, from which it can be distinguished as follows: In *mancus* the cerci of the male are much longer than in *abortivus*, reaching quite to the end of the supra-anal plate, sometimes beyond it, while in *abortivus* they are always distinctly shorter. In *mancus* they are fully twice as long as broad, generally more than this, the apex considerably expanded and distinctly incurved; the furcula is much longer than in *abortivus*, being a fourth as long as the supra-anal plate, while in the latter they are never more than one-sixth as long. In *abortivus* they are about as broad as long, slightly convergent and constricted in the middle, while in *mancus* they are distinctly longer than broad and somewhat divergent. The females are extremely difficult to separate from those of *mancus*, there being scarcely one permanent distinguishing character.

The lateral carinæ of the pronotum are more prominent in *abortivus*, there being a distinct angle between the dorsum and lateral lobes, while in *mancus* this angle is rounded off. In *abortivus* the posterior margin of the pronotum is more or less angulated with the lower margin, in *mancus* there is generally no semblance of an angle here.

Described from fifty-five specimens, of which twenty-five are males and thirty females. Most of these were taken at De Grassi Point, Lake Simcoe, Ontario, and in neighboring localities. The only other locality where I have seen it is Aurora, Ontario, about 22 miles further south. It is found in openings in rich shady woods and on their borders, especially where the timber is of a coniferous growth. I have found it most common in paths in swampy woods composed of spruce, balsam fir, tamarack, paper birch, etc. Seldom more than one or two are seen at once, though by diligent search specimens can be secured any day during the proper season, which lasts from the first week in July, or a little later, to the beginning of October. The earliest date upon which I have taken a specimen is July 2, 1896.

Figures of this species will appear later, in connection with my “Notes on Some Ontario Acridiidae.”

NEW SPECIES OF NORTH AMERICAN MYRMELEONIDÆ.—I.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

Brachynemurus Coquilletti, new species.

Male.—Length, 33 mm.; expanse of wings, 44 mm.*; greatest width of anterior wing, 5.6 mm.; length of antenna, 6 mm.; luteous, marked with dark fuscous; clothed with white hairs, thickly so on abdomen; apical segments of abdomen with some black hairs among the white ones.

Face flat, luteous, bordered above by a pitchy-black band separating the antennæ and narrowly bordering them in front and on the outer side; a longitudinal median black line extends from this band almost to the clypeus. Circum-ocular area luteous, except along the anterior portion of the vertex, where it is fuscous, and on the margin next the eye, opposite the middle of anterior joint of maxillary palpiger, where there is a fuscous spot. Clypeus rather short, luteous, on either side anteriorly an impressed spot; above, a few black bristles. Labrum transverse, luteous; rounded laterally and narrowed anteriorly, nearly straight in front, where it is sparsely clothed with light-coloured hairs. Mandibles piceous, black at tips.

Maxillary palpi of moderate length, luteous; first two joints short, about as broad as long, subequal; third joint a little longer than first two together, somewhat curved, enlarged apically; fourth joint a little shorter than third; last joint as long as third, slightly fusiform (a little swollen medially), apically piceous; tip truncate, pale.

Labial palpi about same length as maxillary, luteous; first joint twice as long as broad; second joint about twice as long as first, curved, enlarged apically; apical joint as long as second, fusiform, strongly narrowed apically, where it is piceous; sparsely clothed with dark hairs; tip fine, truncate, pale.

Maxillary palpigers luteous. Labium and labial palpigers luteous. Mentum luteous, with a longitudinal median dark line, at the posterior end of which is a long bristle†. Gula luteous.

Antennæ clavate, as long as head and thorax, luteous, joints with a fuscous ring at base, clothed with some very short dark hairs or bristles; the two basal joints luteous, clouded with piceous; basal joint set in a yellow ring which is widest in front.

*One specimen, a co-type, collected at San Simon, Arizona, July 5, 1897, by Mr. H. G. Hubbard, expands only 41 mm.

†This bristle is not apparent in some specimens.

Vertex elevated behind, rounded, luteous; post-antennal area fuscous; two transverse fuscous bands on elevated portion; these bands merge into one along the middle third*; a short fuscous prolongation posteriorly along the longitudinal median furrow.

Pronotum as broad as long, narrowed anteriorly, sparsely clothed with rather long white hairs, more thickly so on margins; sides sinuate, front emarginate; anterior angles rounded; luteous, a longitudinal fuscous band each side of middle line; these bands are approximate or coalescent behind the transverse furrow, more widely separated before it; another longitudinal fuscous band on the outer side of each middle one, behind the transverse furrow. Lateral carinae luteous. Beneath luteous, a longitudinal fuscous streak on each side near carina.

Mesothorax sparsely clothed with white hairs; lobes of dorsum strongly elevated; anterior lobe fuscous, a spot each side, and one at posterior margin medially, luteous; lateral lobes fuscous, a few luteous spots near the articulation of wings; on each of these lateral lobes a luteous triangle whose apex terminates near the mid-dorsal line; posterior lobe luteous, a longitudinal median fuscous streak which is wider anteriorly; posterior angles luteous, each with a U-shaped fuscous streak. Below mostly fuscous, at base of wings and legs luteous.

Metathorax sparsely clothed with white hairs; dorsum with lobes less elevated than those of mesothorax; anterior lobe luteous, with a U- or V-shaped fuscous marking; lateral lobes each with a luteous triangle similar to those on corresponding lobes of mesonotum; base of wings above fuscous; posterior lobe similar to that of mesonotum. Sides and below mostly fuscous; bases of legs and wings, and a few spots, fuscous.

Abdomen longer than wings, slender, thickly clothed with white hairs, a few black ones apically, fuscous, the basal segments above luteous with a median black line.

Appendages short, half as broad as long, one-fourth the length of last segment, cylindrical, obtuse on tip, luteous; clothed with long black hairs or bristles; between the appendages below, a short triangular luteous plate.

*In one specimen, a co-type, collected in Los Angeles County, California, by Mr. Albert Koehle, the bands are interrupted at the longitudinal median furrow; in another co-type, collected July 5, 1897, at San Simon, Arizona, by Mr. H. G. Hubbard, these bands are almost entirely merged into one.

Legs of moderate length, luteous, sparsely sprinkled with black or brownish-black at bases of hairs and spines; sparsely clothed with dark hairs and beset with long black spines. Tibial spurs as long as first three tarsal joints, moderately curved, rufo-piceous. Apices of tarsal joints black, third and fourth joints entirely so. Claws as long as fifth tarsal joint, moderately curved, rufo-piceous.

Wings somewhat falcate at tips, hyaline, clothed on venation, and sparsely on membrane, with dark hairs; posterior borders of wings subapically strongly arcuate, almost angulate, making the wings quite broad before tips. Pterostigma luteous, on inner side a black spot formed by junction of sub-costal and median veins; before the pterostigma a few intercostals forked. Principal longitudinal veins luteous, interrupted at junctures of transversals with black; a longitudinal vein between median and submedian entirely luteous; other longitudinal veins and transversals fuscous, interrupted with luteous.

Anterior wings with the anterior transversals springing from the submedian vein above, and some other veins posterior to it, with small fuscous spots; posterior wings shorter than anterior, immaculate. Posterior borders of both wings fringed with dark hairs.

Female.—Length, 25 mm.; expanse of wings, 44 mm.; greatest width of anterior wing, 6 mm.; length of antenna, 5 mm.*

Antennæ more clavate than in male. Abdomen a litter shorter than anterior wings, not luteous on basal segments above; tip luteous; superior parts split, clothed with long dark hairs and beset with coarse black spines at apex; below, two short, cylindrical appendages, clothed with long dark hairs.

Type.—No. 3814, U. S. National Museum. One male, collected July 5, 1897, at San Simon, Arizona, by Mr. H. G. Hubbard.

No. 3814a, U. S. National Museum. One female collected in San Bernardino County, California, by Mr. D. W. Coquillett.

Cotypes.—Collection U. S. National Museum. Two males, one with antennæ and apical segments of abdomen gone, collected July 5, 1897, at San Simon, Arizona, by Mr. H. G. Hubbard; one male with fragmentary abdomen, collected in August, in Los Angeles County, Cali-

*This is a small specimen; a female, co-type, from Los Angeles County, California, collected in August by Mr. Albert Koebele, is 29 mm. in length and expands 51 mm. A third specimen, also a female co-type, from the same locality, collected in July by the same person, is slightly smaller than this latter.

fornia, by Mr. Albert Koebele ; two females collected by the latter in Los Angeles County, California, one in July the other in August.

This species is peculiar chiefly through the shape of the wings, and through the very slender abdomen. Luteous is the prevailing colour in the males, fuscous in the females. The male appendages are very similar, in size and shape, to those of *B. longipalpis*.

CONCERNING TICKS.

BY REV. W. J. HOLLAND, PH. D., LL. D., CHANCELLOR OF THE WESTERN UNIVERSITY OF PENNSYLVANIA.

The other day a distinguished artist friend of mine called upon me with a small bottle containing some whiskey, which by its odour I judged was good, when he first took it from his flask, and in it was what he denominated a "bug." He told me that he had experienced "one of the most wonderful adventures of his life" in connection with the specimen he put before me, and went on to tell me that during the past summer, while sketching in the mountains, he had discovered one evening, when undressing, a small, dark swelling on his breast. He thought it to be a little abnormal growth on the skin and paid no attention to it. From time to time he noticed it afterwards, when retiring, and found to his considerable alarm that it was gradually growing larger, and evil thoughts of cancer, tumors, and what not, began to float through his mind. Finally, after some two weeks had passed, one evening, as he expressed it, "while fooling with the darned thing it came off." He laid it down on the dressing-case before him and was presently astounded to see it slowly crawling away from the spot. Then a small bottle was sought out, the whiskey flask was brought into requisition, and the "bug" was safely bottled, to be referred to me for an explanation. This proved not difficult to give. The specimen was a well-developed example of *Ixodes albipictus*, Packard. We had a hearty laugh together, and my friend assured me that he "would know better the next time, and not let such creatures establish such a lengthy abode upon his person." His adventure recalled to me a letter which I have long had in my possession, intending to publish it, as it is very well written, and adds a touch of humour to the subject. The specimen referred to in the letter is in my collection, and proves to be an example of *Ixodes bovis*, a very common plague in the south-western part of this country. The writer of the letter, a young friend of mine, says :

"I had no idea that my bug was of interest to anybody but myself, but I assure you I was glad to let him go.

"We sleep on the ground all summer here in New Mexico, with no protection and but little covering. Bugs of all kinds, and even centipedes, crawl under and into our beds for shelter. I was on the Rio Gila, near the Arizona line, sleeping on the sand, with a blanket under me and my boots for a pillow, when I absorbed the specimen you have now in your collection. It was probably smaller at that time, as the pain and irritation gradually increased for about two weeks.

"I was seventy-five miles from a physician, and had no idea of consulting one, until the pain became unbearable. In the meantime, I had used all the common domestic remedies which were at hand, for what I thought was earache. Finally the pain destroyed sleep and annoyed me constantly during the day, and I was driven against my will to consult a physician. He examined my ear, told me it was much inflamed, gave me a 'wash,' which I used twice without effect, and I carried the thing two weeks longer. The hearing in my right ear was affected from the very first, but during the last week I lost the ability to hear in both ears, and the pain became almost intolerable. I went to Trinidad and consulted a doctor there, who after a very thorough examination told me it was polypus. In his efforts to remove this he dragged out the bug. My hearing was at once restored, but the irritation remained for some time.

"I have heard of two other cases of the same kind, which were relieved by the injection of tobacco-juice, in one instance after the man had become frantic with pain. These creatures are often found in the ears of cattle and occasionally of horses.

"All results flowing from my enforced connection with the bug have disappeared, the inflammation has vanished, my hearing is as good as ever, and when a tick next gets into my ear I will try the tobacco cure at once, notwithstanding Aunt Beck's objection to its use in any form."

The genus *Ixodes* is of considerable extent, but, so far as is known to the writer, without taking especial pains to look up the entire literature, has not received revisional treatment during the past forty years. A search of the Entomological Record shows that many species have been described in the time which has elapsed since this valuable publication was commenced, but no student has apparently addressed himself to the task of monographing this genus and its allied genera. A thorough revision of the Ixodidæ is a desideratum, which it is to be hoped some enthusiast may before long undertake to give us.

MANITOBA BUTTERFLIES.

As the result of last year's work I have an addition to make to the list of Manitoba Diurni, which appeared in this magazine about two years ago. On July 3rd, when driving across an outlying portion of my farm, in a flowery glade amongst some scrub I saw an unusual looking "*fritillary*" hovering over and settling together with *Argynnis Lais* upon some lillies in bloom. On netting it I found it to be a "green wing," which has been determined by my friend, Dr. Fletcher, to be *A. Edwardsii*. In a short time I secured three or four more examples of this Western species from the same place. On the 7th July I found it again in a similar locality, about a mile south of where I had originally seen it, and secured some more specimens, all of which, except perhaps a couple whose wings were slightly chipped, were in good condition. I went out again on the 10th, but though *Lais* and *Cybele* were on the wing, I did not see *Edwardsii*. A correspondent at Brandon (in this Province), Mr. Boger, writes me that he also took one or two "green wings" this summer; Brandon being 60 or 70 miles to the N. W. of me. He was, when writing, under the impression that his was *A. Nevadensis*. It would be a very curious fact if both species (?) visited Manitoba at the same time, and it would look very much as though they were only varieties of one species. I have just noticed among my series one specimen that varies slightly from the majority, and is somewhat like the description given of *A. Nevadensis*. *Colias Casonia* did not again present itself, though I saw in 1896 at least half a dozen specimens besides the two I caught.

Mr. A. W. Hanham, of Winnipeg, has referred to my collection in the very useful list of Manitoba moths which commenced in the December number of this magazine. I am sorry to say that I am unable to give him any assistance worth mention, through the bulk of my collection being unnamed. This is to be regretted, as I think I might be able to make some additions, and the list should be as complete as possible. He has kindly offered his assistance in naming my insects, and anything he finds new amongst them can appear in a supplementary list at some future date. We poor collectors in the Wild West labour under many and very great difficulties. Not only do specimens suffer more or less in transit through the post, but boxes do not always receive due care and attention "at the other end." The practice, too, of specialists annexing all new and rare species and interesting varieties is much to be

depreciated. I think entomologists might be more generous to one another. For my own part I would gladly pay handsomely in specimens to anyone who would name for me what I send, but I do not like parting with *unique* specimens. I collect only Manitoba insects, and have several species of which I have only seen single examples during the seventeen years I have been in the country. I have them annexed by some specialist. What then? I might, having taken the species, replace it by specimens from Nevada or Colorado, let us say. But they would not be Manitoban specimens, and very likely would present certain minor differences. All thanks and credit being given to those who, through greater advantages and opportunities, have acquired a knowledge which it is impossible for many of their brethren who are less favourably situated to gain, and impart that knowledge, but they exact too heavy a price for it, and by so doing, instead of encouraging the study of entomology, confine it within narrow limits by their action.

E. FIRMSTONE HEATH, Cartwright, Manitoba.

TRYPETA SOLIDAGINIS.

BY MRS. A. J. SNYDER, BELVIDERE, ILLINOIS.

A year ago last autumn, while rambling about the fields, we took especial notice of the galls upon the golden-rod. We saw that there were two kinds, the elongated and the round. We knew that from the former came a tiny moth, well-known to us, and from the latter a fly with which we were not familiar, or, if familiar, not known to come from this gall. The elongated galls were all empty, but the round ones we found upon examination contained each a small white grub. We gathered a quantity of the galls and placed them in a jelly glass on the writing table where they would be constantly before us for observation.

On the following twenty-first of April we noticed something peculiar about one of the galls. There was a movement at one little spot that soon looked like a tiny drop of water. We were on the alert instantly, and with microscopes in hand awaited developments. Upon closer investigation the "drop of water" looked more like a membranous bubble (ptilinum, I think is the correct term for this sac-like organ). With the naked eye it could be seen to expand and relax, and upon it were observed tiny drops of water or some liquid substance,—sweat drops as we shall call them.

The following is a minute description (for an amateur) of the emergence of the fly as seen through a hand lens. In the first place

there seemed to be a depression and ridge like the arcs of a great circle cutting each other at right angles and dividing the sac into quarters. The "sweat drops" stood out upon the ptilinum like little beads as it expanded and relaxed gently.

Suddenly the ptilinum apparently withdrew into the aperture of the gall, being almost out of sight, and then it as suddenly swelled out; at the same time there was a change in the position of the "sweat drops," and they were larger than before.

After this great relaxation and emergence the fly came out rapidly until the eyes were visible. The ptilinum extended far out above the eyes, overshadowing them. The appearance of the visible part of the fly at this period reminded one strongly of a back view of a head that is bald, the eyes of the fly taking the place of the ears. Under the magnifier the eyes were distinctly purplish.

After the head and part of the body were out of the gall the relaxations of the sac were shown by depressions. These depressions were across the top of the sac — laterally — and were four in number. There were also three depressions at the back — horizontally. Sometimes the fly did not seem to gain much in an effort after a relaxation, and at other times the amount of emergence was quite noticeable. When the mouth-parts became visible they were seen to open and the ptilinum to relax simultaneously with each effort. When the fly had nearly emerged the efforts became greater, and the ptilinum sank very much at each relaxation.

After a final struggle the fly crawled slowly out upon the gall and rested. The ptilinum partially collapsed, relieving the fly of its top-heavy appearance, and gradually, and at the same time almost unnoticeably, it was all seemingly absorbed, and a very natural looking fly was before us. We noticed the emergence of a number of these insects, with the same results, as far as we could determine.

The disappearance of the ptilinum at the final stage was almost a mystery. It would seem to be gradually disappearing, and yet, all at once, it was gone and there was not the slightest trace of it. Perhaps a stronger microscope would have revealed more.

We opened some of the galls before the flies emerged to see how heavy a door they had to open. We found the pupa in a small excavation at the centre of the gall, and a circular channel, less than two millimeters in diameter, leading from it to the outside of the gall, only the mere skin of the enlarged stem serving as a covering.

A NEW BOMBYCID.

BY R. OTTOLENGUI, NEW YORK.

Cisthene striata, nov. sp.—Antennæ and palpi black. Head, prothorax and patagia creamy, the prothorax of a deeper shade. Thorax above dull gray. Abdomen rose coloured above and laterally, gray ventrally. Legs brownish-gray.

Primaries, upper side, dull gray, the veins all of a deeper shade, giving the wings a striated appearance. Three narrow longitudinal stripes of creamy colour cross the wing. The first along the costa narrowing and disappearing at the apex. The second along the median vein, arising near the base and reaching the outer margin; this stripe is widest centrally and pointed at each end. The third is between this and the inner margin. It begins at the base and terminates at the upper edge of a distinct yellow spot near the angle. There is also a narrow yellow streak along the inner margin from the base to the spot mentioned. Under side, gray, the more distinct marks of the reverse showing faintly except the spot near the angle which is distinct and rosy instead of yellow.

Secondaries, upper side, rosy with gray apices. Reverse the same. Expanse 17 mm. Described from one male in the collection of the author. Taken at Miami, Florida, by Mr. Brownell.

COCKERELL ON PANURGUS AND CALLIOPSIS.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Prof. Cockerell's treatment of these genera is likely to create an erroneous impression, which should be corrected wherever his statements are made. In Trans. Am. Ent. Soc., XXIV., 150, he says: "It is perfectly evident that the so-called species of *Panurgus* of North America are not all of the same genus." In the Dec. CAN. ENT., p. 287, he says: "The result is extremely interesting, and seems to show that we have for many years been placing bees in genera to which they by no means belong." To those acquainted with the literature and the bees in question this has been clearly understood, at least since it was distinctly stated by Cresson ten years ago. In the Synopsis, page 134, Cresson says: "The genera *Panurgus*, *Calliopsis* and *Perdita* have been made the receptacle for a number of species which do not properly belong to either of these genera, and have been placed there provisionally until more abundant material can be obtained, when a more careful study may be made of their characters." Mr. Cresson wisely intended to save himself and others from fabricating such genera as *Pseudopanurgus* and *Hemihalictus*.

A NEW EGG-PARASITE OF THE PERIODICAL CICADA.

BY L. O. HOWARD, WASHINGTON, D. C.

The Chalcidid subfamily Trichogrammatinae is composed entirely of species parasitic in the eggs of other insects. A synopsis of the genera has recently been published by Dr. Chr. Aurivillius in "Entomologisk Tidskrift" for 1897, pp. 249-256, apropos to the establishment of a new genus (*Oophthora*) for a species which he has reared in Sweden from the eggs of *Semlidis lutariae*. In this synopsis of the genera Dr. Aurivillius makes *Lathromeris*, Förster (Hymenopt. Stud., 1856, 2, pp. 87-89) a synonym of *Chætostricha*, Haliday (An. and Mag. Nat. Hist., Ser. 2, Vol. 7, 1851, p. 212).

Without being able to consult types, it is obvious to the writer, from comparison of Haliday's original description with that of Förster, that the two genera cannot be synonymous since *Lathromeris* has a compact 4-jointed club, whereas *Chætostricha* is described as having the 3rd joint broad, with the 4th, 5th and 6th forming the club (3-jointed). Moreover, *Lathromeris* has a ring-joint which was not mentioned in the description of the Halidayan genus. The following description, therefore, may be considered as reviving the genus *Lathromeris*. The additional "kleines griffelformiges endglied" which Förster states appears to be present with *Lathromeris* is not present with the following species, but the club bears several long apical hairs which, were they moistened and stuck together, would have the appearance described by the famous German hymenopterologist.

LATHROMERIS CICADÆ, new species.

Female.—Length, .74 mm.; expanse, 1.48 mm.; greatest width of fore wing, .21 mm. Body long and slender, abdomen acuminate and longer than head and thorax together; antennæ short, clavate, scape rather stout, pedicel still stouter and half as long as scape, ring-joint very minute, almost imperceptible, club stouter than pedicel and as long as scape, compact but rather plainly divided into 4 subequal joints, the apical one being slightly the longest, fusiform in shape and with rather long delicate hairs, especially toward the tip; wings ample, with short marginal cilia; stigmal vein not curved and extending into disk of wing at an angle of about 45 degrees from costa. Colour sordid yellowish, occiput black; pronotum dusky, black at sides; abdomen dark at sides; eyes coral red; ocelli very dark red, almost claret coloured; antennæ slightly dusky.

Male.—Slightly shorter than female ; abdomen with parallel sides and rounded at tip ; antennæ with a dark blotch at base of club.

Described from two males, two females, reared from eggs of *Cicada septendecim*, collected by T. Pergande, in Virginia, just across the Potomac River from the City of Washington, in July, 1895. All four specimens mounted on a single slide. Type No. 3850, U. S. Nat. Mus.

NOTES ON SOME BEES OF THE GENUS ANDRENA FROM HARTFORD, CONNECTICUT.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The following notes are based on specimens collected by Mr. S. N. Dunning, all at Hartford :—

- (1) *Andrena Dunningi*, n. sp.—♀. Length 12 mm. ; black, with ochraceous pubescence. Facial quadrangle broader than long ; lateral facial depressions covered with appressed pubescence ; clypeus shining, with large close punctures, median line impunctate ; front below ocelli irregularly striate, a keel descending from middle ocellus ; vertex minutely roughened, with ill-formed punctures ; antennæ reaching to tegulæ, wholly dark, first joint of flagellum a little longer than the two following together ; mandibles dark, rufescent at extreme tip ; *process of labrum broad and low, but very large, gently curved* ; thorax, even the metathorax at base, quite densely covered with long fulvo-ochraceous hair, that on pleura like that above ; *mesothorax minutely tessellate or lineolate, with strong deep punctures* ; enclosure of metathorax granular, ill-defined ; tegulæ shining, dark brown ; wings strongly flavescent, not darkened at apex, stigma ferruginous, nervures dark brown ; *second submarginal cell very broad, nearly as large as the third*, receiving the first recurrent only just beyond the middle ; legs black, the small joints of the tarsi dark reddish-brown ; *pubescence of femora, and of hind tibiae, ochraceous ; that of the other tibiae, and all the tarsi, very dark chocolate brown*, shining paler in certain lights ; abdomen shiny, minutely tessellate, *with quite numerous but very small and weak punctures ; surface of abdomen bare, without bands ; apex densely clothed with fulvous hair* ; venter with long fulvous hairs.

Hab.—Hartford, Connecticut, May 26, 1895 (S. N. Dunning). Superficially this species looks much like *A. vicina*, but the pubescence of the apex of the abdomen at once separates it. It is very much like *A. pruni*, but that has the punctures of the abdomen much stronger, the basal joint of the hind tarsi is longer and narrower, and the colour of the tarsal pubescence is entirely different.

- (2) *A. Forbesii*, Rob.—♀. April 19. Beside the colour of the pubescence, *Forbesii* is distinguished from *rugosa* by the smaller and more numerous ridges on the base of the metathorax; about 20 in *Forbesii*, about 12 or 14 in *rugosa*. The abdominal hair-bands of *Forbesii* may be practically obsolete.
- (3) *A. Cressonii*, Rob.—♂, April 30; ♀, April 19. The ♂ is not quite typical in the face-markings.
- (4) *A. bipunctata*, Cress.—Many males, April 19 to May 18.
- (5) *A. vicina*, Sm.—April 21 to June 18. Very many. None are var. *errans* (*A. errans*, Sm.). At Olympia, Washington State, Mr. T. Kincaid takes the typical form and var. *errans* together, the variety being the most numerous.
- (6) *A. fimbriata*, Sm.—♀, Sept. 9 and 15. ♂, Sept. 9. The male is smaller and more slender than the ♀; face wholly dark, with long yellow hair; flagellum faintly ferruginous beneath; process of labrum bifid; apex of abdomen with yellowish-white hair; pubescence of legs pale.

BOOK NOTICE.

SOME CONSIDERATIONS ON THE NATURE AND ORIGIN OF SPECIES.—By J. W. Tutt, F. E. S.

This is the title of the presidential address delivered before the City of London (England) Entomological and Natural History Society, December, 1897, published in a pamphlet of 20 pages. Mr. Tutt interestingly reviews the recent theories as to the causes of species formation, touching on the presence of variation in organic beings, action of natural selection, origin of local races by adaptation to differing environment, etc., and comes to the conclusion that all generic and specific characters are due to the past or present action of natural selection. Comparatively fresh points are made in that specialization of genital organs does not necessarily accompany other specialization, and that isolation may be brought about by difference in time of emergence, difference in habit or in the hours of mating, as well as by geographical conditions.

Mr. Tutt does not believe that climate, food, sexual selection (in insects at least), isolation or laws of growth can produce specific characters; all such must be utilitarian. This is the position so ably defended by Wallace, but nevertheless certainly untenable.

The reviewer would refer Mr. Tutt to the case of *Datana*, where all the specific characters seem so evidently due to the action of isolation alone, as most recently lucidly explained by Romanes. In this case the isolation is due principally to different food plants.

HARRISON G. DYAR.



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Fig. 1, *Deva* (?) *ornata*, 2, *Basilodes Howardi*, 3, *B. territans*, male; 4, *B. territans*, female; 5, *Kallitrichia albavena*; 6, *K. pendula*; 7, *K. sagittalba*.

[NOTE.—The colouring is merely approximate, all, except No. 2, having practically white secondaries, with dusky shadows.]

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METALLIC SPECIES OF BASILODES AND NEW SPECIES OF ALLIED GENERA.

BY R. OTTOLENGUI, NEW YORK.

Among the *Basilodes* there are three closely allied species of very similar pattern, the fore wings being mainly solid metallic golden. These are *territans*, Hy. Edw., *Howardi*, Hy. Edw., and *Arizonæ*, French; *Howardi* and *Arizonæ* having been described as *Plusias*. The most casual examination of the front of *Howardi* separates it structurally from *Plusia* and places it with *Basilodes*. *Arizonæ* I have not seen, the only specimen known to me being the "type" in the collection of Prof. French. I, however, sent a male and female of *territans* to Prof. French for comparison with his "type," thinking that Edwards might have redescribed French's species. From Prof. French's reply, together with a photograph of the type which he kindly had made for me, I have little doubt that his species is a *Basilodes*, unless, indeed, it may belong to an allied, undescribed genus of which I have to write.

The following notes may aid in identifying these three species :

Basilodes territorans, Hy. Edw.—Edwards described this by comparison with *Howardi*, but fails to note two differences, probably because his single type of *Howardi* is in indifferent condition. He speaks of two spots along the costa. This is clearly discernible in the female (see plate, fig. 4), but the male is slightly different. The ground colour persists along the median vein as far as the cell, thus dividing the metallic area and isolating a long narrow metallic spot between the costa and the vein (see plate, fig. 3.) Moreover, in *territans* the metallic colouring reaches quite to the fringes all along the outer margin, whilst in *Howardi* at the centre of the outer margin the ground colour shows as a semi-lunar blotch. This is more distinct in the female (*Howardi*) than in the male. In *territans* the secondaries of the male are clear white, while in the female a dusky shade shows along the costa and outer margin. Male expands 33 mm.; the female 35 mm. My specimens agree with the types in the Neumöegen collection.

Basilodes Howardi.—I have not seen the description, but it was made from a single specimen. It is worth recording, therefore, that both sexes are alike except in size. The male expands 35 mm., and the female 37 mm. These measurements might lead one to imagine that *Howardi* is but little larger than *territans*, which would be a gross error, *Howardi* being a much more robust insect, with wings much broader in proportion to their length than in *territans*. Both sexes have uniformly brownish secondaries. My specimens agree with the type in the Edwards collection. (Plate, fig. 2.)

Basilodes Arizona, French.—Of this Prof. French writes to me: "Your two specimens (*territans*) have the same general colour as *Arizona*, but the markings are different. *Arizona* has the posterior margin of the fore wings longer in proportion. The type of *Arizona* has a patch at posterior angle (purplish-brown), and one on the middle of the posterior margin." The original description says "hind wings whitish," but as it refers to a single male specimen, I should expect the female to show dusky margins as in *territans*.

SYNOPSIS.

Metallic golden fore wings, costa and markings purplish brown.

1. Two spots along costa, metallic area reaching from the base fully to the fringes at outer margin, anal angle very rounded, secondaries white with dusky border, female; or, same with median vein showing brownish and secondaries pure white, male.....*territans*.
2. As above, additional spots at anal angle and centre of posterior margin, anal angle less rounded.....*Arizona*.
3. Metallic area cut near the base, large triangular brownish blotch along the costa, another at the base along the posterior margin, and a smaller blotch at centre of outer margin; secondaries brownish, anal angle not rounded.....*Howardi*.

Deva ornata, nov. spec.—(See plate, fig. 1.) Head, antennæ, palpi and thorax dull yellowish-brown. Primaries brilliant metallic golden. Pattern exactly as in *Basilodes Howardi*, except that the metallic area reaches the fringes all along the outer margin. The costa is pale yellowish-brown, except at the apex, where the metallic colouring persists. An irregular triangular blotch depends from the costa, in the centre of which the reniform is plainly visible, outlined by a darker brown line, a line of similar colour crossing the blotch obliquely between the reniform

and the apex. The reniform within the brown outline is of a deeper shade than the surrounding field, and by close examination seems to show a few metallic scales. The metallic colouring is cut near the base by the t. a. line which connects the costa with a triangular blotch at the inner margin near the base as in *Basilodes Howardi*. In the proper light the t. p. line appears as a series of faint dots, invisible when the light is reflected by the metallic scales. Fringes full, alternating two shades of light brown, and divided by a fine line which parallels the outer margin, making the fringes seem double. Secondaries clear white (satiny), a hair line of brown at the extreme outer margin. Described from one specimen labeled "Hot Springs, N. Mexico, 7,000 ft. Alt." Type, male, No. 25975, National Museum, Washington. Expands 31 mm.

I must at once declare that this species is not a *Deva* at all, but is probably an undescribed genus, near *Basilodes*. I cannot risk a description of a genus, however, on account of the condition of the under side of the insect, which is badly smeared with glue. The structure of the front, however, with its long palpi, removes it from *Basilodes*, although I found it in the Museum collection labeled *Basilodes Howardi*, which it so closely resembles. It may rest tentatively with *Deva* until found again.

Kallitrichia, gen. nov. (κάλλος, τρίχες, having beautiful hair).—Antennæ simple, slightly serrate, laterally compressed. Clypeus slightly roughened, no tubercle, rounded. Palpi oblique, short, very slightly exceeding the front; first and second joints subequal, third joint half the length of the second; smoothly haired. Eyes naked. Tongue moderate. Thorax smooth. Vestiture short, hairs with a few scales intermingled. Legs: tibiæ without spines, anterior tibiæ with claw at tip. Abdomen smooth. Primaries, costa straight, wing triangular. Secondaries full and rounded.

Kallitrichia albavena, spec. nov. — Antennæ brown (white at base and perhaps throughout in fresh specimens). Head, thorax and body white. Primaries metallic green (pale pea green). Costa shows as a rigidly straight heavy white line, uniting at the apex with the white fringes, which in turn join a fine white line which borders the inner margin. Median vein white along the outer half (and perhaps throughout in some specimens, there being a faint indication of such a tendency in the specimen before me). Secondaries pure white (satiny). Described from one female which expands 30 mm. Habitat, Arizona. Type in collection of the author. (Plate, fig. 5.)

Kallitrichia pendula, spec. nov.—Similar to the last, except that all the white markings here are dusky, only a few scattering pure white scales appearing. The costal mark is not so rigid along the inner edge. The white median vein of *albavena* disappears, and in the region of the reniform we have a pendulum-shaped spot hanging from the costa. secondaries dusky. (Plate, fig. 6.)

Described from one specimen, male, which expands 30 mm. Habitat, Arizona. Type in collection of the author.

It should be noted that in this species the costa is not so rigidly straight as in the last, being slightly bent near the base. When other specimens of this are found, I should not be surprised to find in some specimens that the median vein would show brownish, separating the metallic area, as was noted in the male of *Basilodes territans*.

Kallitrichia sagittalba, spec., nov.—(Plate, fig. 7.) Antennæ brownish. Head, thorax and body white. (I have called the bodies of these three species white, because what scales seem fresh are white, but as the bodies are in poor condition and somewhat greased, when fresh they may be brownish.) Primaries: solid metallic pea green. A wide white band occupies the costa, continuing as a narrow white band all along the outer margin and around the angle, where it is gradually lost. The outer terminals of three veins reach the outer margin as faint white lines. The upper of these extends from the costal band, and thus encloses a bit of the metallic colouring near the apex. The other two are the points of a prominent white sagittate mark which occupies the centre of the wing. Fringes full and white. Secondaries dusky, more so in the female. Male expands 25 mm.; female, 28 mm. Habitat, Arizona. Types, male and female, in collection of the author.

OBITUARY.

On the 18th of February, MR. JOHNSON PETTIT died at Buffalo, N. Y., and was buried a few days later at Grimsby, Ont. For many years Mr. Pettit was a most diligent and successful collector of Coleoptera in the neighbourhood of Grimsby, and was well known amongst Entomologists both in this country and the United States. After forming a very complete collection of the beetles of Ontario, so far as known at that time, he gave up the pursuit and turned his attention to Geology. Subsequently he sold his cabinet of insects to the Entomological Society of Ontario, at a nominal price, in order that it might be kept in a place of safety and preserved from destruction. His work was characterized by remarkable neatness and painstaking accuracy.

A NEW ORCHARD PEST—THE FRINGED-WING APPLE-
BUD MOTH (NOTHRIS? MALIGEMMELLA, n. sp.).

BY J. M. STEDMAN, PROFESSOR OF ENTOMOLOGY, UNIVERSITY OF MISSOURI.

GENERAL REMARKS.

While experimenting two years ago with the Leaf Crumpler and the Leaf Folder, a gentleman asked me to visit his apple orchard, some two miles distant, and to observe the destructive work of what he supposed was the Leaf Folder. The orchard had been in bearing for several years and covered sixty acres. The apple trees had at that time just shed their blooms (petals) and the adjacent orchards appeared green, while the infested one was very conspicuous, appearing as if a fire had swept through it.

On entering the orchard it was seen at a glance the injury was not caused by the Leaf Folder, but by a bud moth, which I at once concluded must be the Eastern Bud Moth (*Tmetocera ocellana*). However, as soon as I saw the larvæ that were doing the work, I observed that we had to deal with an entirely different species of insect, one which I had not observed or read of, and yet one that was doing a vast amount of damage, for the entire orchard was not only losing its prospective heavy crop of fruit, but also a large per cent. of the developing leaves and shoots, and as a consequence, the prospects for next year's fruit buds.

THE DISTRIBUTION OF THIS INSECT.

From inquiry, it seems this pest first made its appearance in one corner of the apple orchard two years previously, and since that time had multiplied to such an extent as to not only cover this orchard, but had spread into the edge of two adjacent apple orchards, but not into an adjacent pear orchard. The moth had its own way in this orchard, however, since the party owning it did not up to that time believe in spraying, and this enabled nature to take her course; while in most commercial orchards the pest might not have multiplied so rapidly owing to the sprayings applied for other insects.

Thus far we have seen this moth only in the apple orchards in Jackson County, although several fruit-growers have lately reported its presence in their apple orchards in other western counties of this State, but they have not as yet sent specimens for identification.*

*Since the above was written I have been reliably informed that this insect has been doing considerable damage in Kansas for the past three years.

Although we have not been able to determine, as yet, either the original locality from which this moth came, or the original food plant, it is not improbable that this insect has but lately taken to the apple, and that it existed and may now exist as an obscure insect feeding on some wild and uncultivated plant.

THE APPEARANCE AND DESCRIPTION OF THIS PEST.

The egg is very small, being only 0.6 mm.* in length, and 0.35 mm. in breadth, and is, therefore, apt to escape notice. It is of a uniform light yellow colour, oval in shape, with the surface thrown into small shallow depressions and elevations, which become larger and deeper at one end, in the centre of which there is a protuberance or very short peduncle. One of these eggs is shown in figure 8, greatly enlarged.

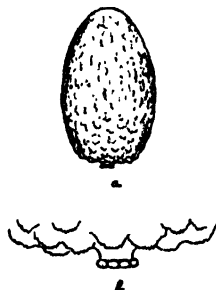


Fig. 8.—Egg of Fringed-Wing Apple-Bud Moth, *Nothris? maligemmella*—greatly enlarged; a, entire egg—X 30 Diam.; b, one end of same still more enlarged. (Original.)

The larva is also very small when first hatched, being less than 1 mm. in length. It is at first of a light yellow colour, with the head shining black, and the shield on the dorsal part of the first thoracic segment of a seal brown colour; the body is sparsely clothed with short light-coloured hairs arising from slight elevations, some of which have a darker coloured centre; the three pairs of true legs are brown, while the five pairs of pro-legs are of the same colour as the body, and are borne by the sixth, seventh, eighth, ninth, and last segments. As the larvæ become a little larger, the above characters remain the same except that the shield on the dorsal part of the first thoracic segment soon becomes shining black like the head, and the general colour of the body becomes more of a light greenish-yellow colour, due largely to the transparency of the body allowing the intestine, which is filled with green food, to show through somewhat. These characters



Fig. 9.—Larva of Fringed-Wing Apple-Bud Moth, *Nothris? maligemmella*—greatly enlarged—X 12 Diam. (Original.)

*There are about 25 mm. to an inch.

are now retained until the larva is nearly full-grown, when the colour of the true legs and of the head and shield become lighter and finally of the same colour as the general body. The full-grown larva is about 8 mm. in length. Figure 9 represents a larva 6 mm. in length, greatly enlarged, and will give one a good idea of the appearance of the larvæ of this moth throughout the greater portion of their existence. They are very conspicuous with their light greenish-yellow bodies and glossy black heads and shields.

The pupa, which stage is passed within a thin, white, silken cocoon, is 5.5 mm. in length and 2 mm. in width; of a uniform brown colour, and with a row of small, almost round depressions along each side of the sutures between the last five abdominal segments, and with indications of depressions in the form of markings along the sides of the other abdominal sutures. Figure 10 represents a lateral view of one of these pupæ greatly enlarged.

The adult is represented natural size in the photograph in figure 11, while figure 12 represents a photograph of this same moth enlarged. Since this moth belongs to the group *Tineina* of the small moths known as Micro-Lepidoptera, and since I had failed to find a description of this species in the literature at our command, a specimen was forwarded for determination to Dr. L. O. Howard, of the Entomological Division of

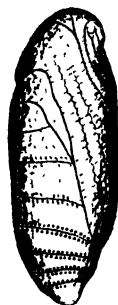


Fig. 10.—Pupa of Fringed-Wing Apple-Bud Moth, *Nothris maligemmella*—much enlarged—X 7 Diam. (Original.)

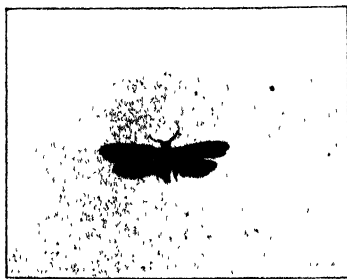


Fig. 11.—Adult Fringed-Wing Apple-Bud Moth, *Nothris maligemmella*; natural size. (Original.)

the United States Department of Agriculture, Washington, D. C. Dr. Howard reported that the species could not be found in the National Museum collection. Therefore, since only two entomologists in the United States have made a specialty of this group of insects, and since Miss Mary E. Murtfeldt, Kirkwood, Mo., has perhaps done more work in this group than the other entomologist, I sent her two adult moths and asked her to name this species, and if it proved to be a new one to describe it. She kindly consented to do so, and as it

proved to be a new species her description of the adult is as follows:

"Alar expanse 14 to 15 mm. General colour, satiny brownish-buff with slight opalescence, and more or less leaden shading on thorax, wings and body. Head buff, densely and somewhat shaggily scaled. Eyes prominent, purple-black. Antennæ two-thirds as long as wings; basal joint conspicuously long and stout; second joint also long with the inner side peculiarly excavated. Palpi (labial) long recurved with short almost concealed basal joint, long slightly thickened second joint and slender tapering terminal. Thorax broad; patagia rather large, all anteriorly bordered with leaden gray.

Fore wings varying in colour from almost clear buff to buff so interspersed with the darker scales as to produce a 'smudged' effect; a small but distinct black discal dot and a group of five smaller, less clearly defined ones at the base of the terminal third, constitute the ornamentation. Hind wings rather broad, somewhat paler and more lustrous than the primaries.

Fringes concolorous with wing surface, also varying

in intensity of the dark shadings. Body, yellowish gray with bright buff anal tuft. Legs agreeing in colour with under surface, tibia especially of hinder pair, densely clothed with long but appressed hairs.

"Described from two males, one perfect, the other somewhat mutilated.

"The generic location of this insect is provisional, merely. In pterogastic and palpal characters it agrees quite closely with some of the Gelechiidæ, but even from these the venation presents some differences, while the structure of the antennæ renders the erection of a new genus probable, when a more liberal supply of specimens admits of closer microscopic study of the separate organs."

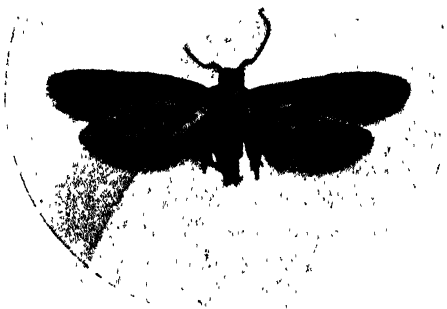


Fig. 12.—Adult Fringed-Wing Apple-Bud Moth, *Nothris maligemella*; enlarged— $\times 3$ Diam. (Original.)

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE
GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, NEW YORK, N. Y.

PALEACRITA LONGICILIATA, n. sp.

Expands 26 mm. Palpi dark fuscous; front very broad, dark fuscous, slightly tufted; antennæ fuscous gray, subpectinate, the fascicles of hairs fine, silky, very long, some six to ten times diameter of stem; thorax dark fuscous gray; abdomen dark fuscous. Fore wings, costa strongly arched, apex quite pointed, inner angle rounded, whole wing narrow and lanceolate; colour light fuscous, generally washed over with dark fuscous, with numerous black atoms, especially on the veins, making them linearly blackish; also apically and in small indistinct shadings across the wing light gray, also light gray shading at ends of veins at margin; marginal points intervenular, blackish; fringe long; fuscous gray, and light gray; hind wings even fuscous, veins darker; fringe long, dark fuscous. Beneath even fuscous on all wings about colour of hind wings above, veins darker, the fore wings with a sprinkling of dark fuscous atoms.

Palo Alto, Cal.; from Dr. Barnes.

P. SPECIOSA, n. sp.

Expands 32 mm. Palpi black, front thorax and abdomen dark fuscous, the thorax with some black scales intermixed, the abdomen a shade lighter fuscous. Fore wings whitish-gray, with five somewhat diffuse cross lines made up of black scales not very solid, the first, sub-basal, bent outward at cell; the second, just within middle, bent at costal vein, and darkest costally, thence straight across wing; the third, just beyond the black discal spot, not very distinct, except at costa, where it is distinct and black, forming the inner edge of a large suboval white spot which reaches to apex; the fourth line, broad, diffuse, subdentate, reaching to the apical spot; outer line diffuse, indistinctly dentate, following the apical spot on outer margin nearly to apex, becoming there distinct, heavy, black; between fourth and fifth, and also fifth and margin, the whitish-gray shows in a dentate or subdentate band; margin black, the black broader between veins, fringe fuscous. Hind wings light fuscous, veins more or less darker. Beneath light, smooth, fuscous, the lines of fore wing faintly shadowed, especially at costa and apex; submarginal space brokenly darker, marginal line blackish.

Glenwood Springs, Colo., May 3; from Dr. Barnes.

EUDULE HYALINA, n. sp.

This insect is of the size and shape of *E. unicolor*, Robs., from Texas, but, instead of being of its colour, is of the light straw colour of *E. mendica*. Wlk. It is apparently more hyaline than its congeners, and is very frail in its appearance. The wings are evenly unicolorous.

Senator, Ariz; from Dr. Kunze. Taken September 9th, 1896.

TEPHROCLYSTIS BOREALIS, n. sp.

Expands 16 mm. Palpi fuscous, slightly ochreous; front thorax and abdomen smooth silky fuscous, with a bluish tint. Fore wings fuscous, with cross lines fine, faint, the basal rounded, wavy, geminate, the middle wavy; the outer heaviest towards and at costa, starting straight out at costa to vein 8 just beyond cell, following it towards base the distance of the angle from costa, then turning at an angle, almost a right angle, through discal spot straight, or nearly so, to inner margin. Hind wings fuscous, even, with wavy lines very faintly showing. Beneath fuscous, darker at costa on fore wings, and with hind wings darkened and lightened into 6 or 7 rounded parallel shadings.

Winnipeg, Manitoba; from Mr. Hanham.

TEPHROCLYSTIS LATIPENNIS, n. sp.

Expands 16-18 mm. Palpi long, porrect, heavily scaled, black and fuscous mixed; front somewhat tufted, fuscous or blackish gray; thorax fuscous gray; abdomen fuscous-gray to gray, segments sometimes tinged with brownish. Fore wings broad, gray to fuscous-gray, overlaid more or less with blackish, forming an extra basal, and marginal broad darker bands; cross lines light, geminate, wavy; one basal, the second within the prominent black discal spots, the outer extradiscal, the outer considerably bent below cell and often lined with black within; a faint submarginal zigzag line, a marginal row of black dashes separated at end of veins. Hind wings broad, rounded, of same colour as fore wings, the basal and middle lines slightly indicated, the outer geminate, quite distinct, bent considerably at middle, wavy, margin darker; a marginal black line; discal points black, distinct. Beneath as above, the fore wings with markings more faint, the hind wings very nearly as above.

Quebec, Canada; from Mr. Hanham.

TEPHROCLYSTIS SUBCOLORATA, n. sp.

Expands 20-23 mm. Palpi and head clear blackish; thorax blackish-gray; abdomen blackish-fuscous. Fore wings gray, overlaid with blackish; the wings narrow extended, the lines quite distinct; basal line

geminate, bent, wavy ; median lines three, bent at discal spot, the middle one running through this, then bent outward at lower side of cell, curving thence around to inner margin ; outer line quite broad, of the ground colour, with a fine central black line, and edged on both sides with blackish, bent around from costa to vein 6, then parallel with outer margin ; discal spots large, oval, jet black. Hind wings with much less black, with two outer rounded blackish lines, and black discal spots ; beneath gray, fore wings with a distinct, rounded, black, outer, rather broad line, black discal spot, blackish apex and outer margin, a blackish dot along costa near discal spot, and a blackish submarginal line ; hind wings with outer line distinct, black, a submarginal fine line, black margin, and black discal spot. The markings below vary in distinctness, but are generally sharp and clear.

Arizona, without other location ; also from San Francisco mountains. From Dr. Kunze. The latter taken July 20th, 1897.

TEPHROCLYSTIS NIVEIFASCIA, n. sp.

Expands 18 mm. Palpi rather long, somewhat heavy, blackish ; front tufted, blackish ; summit fuscous, or whitish fuscous ; thorax fuscous gray ; abdomen fuscous, with whitish markings dorsally on each segment ; fore wings white, with black or blackish-fuscous running into wavy cross lines, mostly indeterminate and more emphasized on veins, these lighter, finer and more distinct just beyond discal spot forming a light shading in a broad white or whitish band, bent out beyond cell, and somewhat angulate below costa ; outer field blackish, with fine, wavy, indistinct, whitish line. Hind wings whitish, with fuscous or black shadings, deeper and suggesting wavy lines outwardly and along inner margin ; discal spots on fore wings prominent, jet black, on hind wings black but less prominent ; beneath lighter, smoother, the general colours above reproduced with less fuscous shading among the black ; discal spots black, distinct.

Santa Fe, N. Mex. ; from Mr. Cockerell. Oregon. The latter type in National Museum collection ; this being more fuscous in its shadings. Museum type No. 3920.

TEPHROCLYSTIS ACUTIPENNIS, n. sp.

Expands 26 mm. Palpi short, fuscous ; front light fuscous gray ; collar black ; thorax fuscous, with a reddish shade ; abdomen light fuscous, gray dorsally, with fine black cross line at base, and a white cross line on second segment ; fore wings long, acute, fuscous, with

darker fuscous shadings running into lines, more distinct on outer half and running subparallel with outer margin, slightly wavy, merging together towards apex and reaching outer margin below apex, the inner one separating, and going to costa with a sharp angle at veins 7 and 8 ; discal vein lighter, preceded from base half way out with a line of black spots ; a line of black spots on subdiscal, on outer cell ; and beyond cell below vein 9, these latter becoming merged into a black line ; a darker shading at middle of inner margin, and near dorsal angle ; the whole wing with a faint brownish shading ; discal spots black. Hind wings whitish, fuscous stained, marked with blackish on inner margin ; marginal line black ; discal spots black ; beneath lighter fuscous, smooth, quite even ; on fore wings a blackish outer line, angulate below costa, very indistinct, and a corresponding median line on hind wings ; discal spots evident, black.

Los Angeles Co., Calif. Type in National Museum collection, No. 3954.

TEPHROCLYSTIS PERFUSCA, n. sp.

Expands 23–26 mm. Palpi moderate, porrect, end deflexed, fuscous, black on end ; front fuscous, summit lighter ; thorax fuscous ; abdomen blackish-fuscous ; all wings broad, rounded, of an even fuscous colour, squamose in appearance, faintly shaded into indeterminate wavy lines, with scattered blackish atoms, more prominent on costal space ; discal spots faint ; marginal lines blackish ; beneath smoother fuscous, with blackish shade at apex of fore wings, and two rows of faint blackish points on hind wings ; discal spots faint, marginal lines darker, broken on fore wings.

Easton, Washington ; from Dr. Riley. Utah ; taken in June. The latter type in National Museum collection, No. 3919.

EUCYMATOGE GILLETTEI, n. sp.

Expands 30 mm. Palpi moderate, stout, black ; front tufted, black ; thorax gray ; abdomen fuscous gray. Fore wings slate gray with a fuscous tinge, thickly peppered with black scales ; basal line black, fine, not distinct, bent at middle ; outer line subparallel with outer margin, scalloped, the points on the veins pointing inward ; all veins brokenly lined with black ; a black marginal line ; discal spot black, not very distinct ; hind wings gray ; darker outwardly, four or five parallel blackish lines showing along inner margin half way across the wing ; margin

somewhat wavy, with a fine black line ; discal spot small, black. Beneath light fuscous ; outer line showing faintly on fore wings, and a faint rather broad line at middle of hind wings.

Colorado ; from Dr. Gillette.

MESOLEUCA ABACTA, n. sp.

Expands 34-36 mm. Palpi not heavy, moderately long, erect, almost recurved, blackish ; front thorax and abdomen fuscous, more or less stained with ochre ; abdomen tufted at end ; fore wings broad, light gray, more or less striated crosswise with blackish ; basal line fine, distinct, some angled at middle, sharply black ; one-third out another black line, turned outward from costa, sharply angled on cell, thence running broadly and heavily nearly straight to inner margin ; this is followed by a finer, almost parallel line, which is somewhat broken on posterior half, a faint, much broken black line just beyond discal spot, and beyond that a quite heavy black line angled outward between 3 and 4, broken posteriorly ; a clear black rounded spot costally at apex ; marginal line black ; discal spots prominent, black, well out on wing. Hind wings fuscous, lighter basally, becoming darker and with faint shadowy darker lines towards outer margin and parallel with it ; beneath fuscous, much the colour of hind wings above, the fore wings becoming darker along costa and towards apex.

Arizona ; one of the types is in National Museum, No. 3924.

HYDRIOMENA PERNOTATA, n. sp.

Expands 34 mm. Palpi rather short, sordid fuscous ; front of same colour ; thorax fuscous gray, with black edging to patagiæ ; thorax dark fuscous, black dorsally, lighter fuscous posteriorly on segments ; fore wings rather long, grayish fuscous, broken up with irregular black spots ; these on the basal half very irregular, so that the lines of which they are the evidences are entirely indeterminate ; a whitish fuscous band beyond discal spot, edged outwardly with a geminate broken, dentate, wavy, and angled black line running in general direction, parallel with outer margin ; a submarginal incomplete row of black dashes, the space having a bluish stain. Hind wings light fuscous with an ochre reddish stain outwardly, marginal line black, finely broken on all wings ; beneath rather deep broken fuscous, becoming a large blackish spot towards apex ; hind wings as above, but much darker ; the fore wings are also considerably ochre stained.

Fort Wrangel, Alaska.

HYDRIOMENA OCCIDENS, n. sp.

Expands 30 mm. Palpi short, fuscous; front gray; thorax light gray, intermixed with black, becoming white at middle above, and with black edge behind; abdomen gray, mixed with black, segments white lined posteriorly; fore wings white with shadings of fuscous generally evenly distributed, emphasized somewhat on veins, forming wavy, very indefinite lines, and giving a general mottled appearance. The veins are marked with fine clear black, broken into dashes of even or nearly even lengths, these showing very sharply on posterior and outer portions; marginal line black broken; costa more broken in colour than rest of wing; a rounded broken black line close to base; hind wings white with fuscous tinge; discal spots fine, black; margin black, broken; beneath light fuscous, broken into shadings. On fore wings an outer broken band of blackish spots, and one or two spots indicating another on hind wings.

Oregon. Type in National Museum, No. 3922. Another specimen in my own collection.

HYDRIOMENA GRANDIOSA, n. sp.

Expands 36 mm. Palpi moderate, blackish fuscous; front fuscous; thorax fuscous gray, marked with reddish on anterior part and on posterior tufting; abdomen light gray in front, more blackish posteriorly, segments whitish lined, with more or less of reddish dorsally; fore wings strongly pointed at apex, with posterior angle stronger than usual, marked with dentate wavy even bands, subparallel to each other and outer margin; the middle rather broader, inclosing discal spot, whitish, those on either side of it darker than the rest of wing; three more basally, the middle one somewhat darker than the two others; the whole wing with more or less of reddish, more especially evident on outer dark band and outer space; a submarginal row of black points on veins; marginal line black, broken somewhat, wavy; fringe interlined; hind wings whitish, fuscous stained two faint median lines, outer shadings and black wavy marginal line; beneath even fuscous, two lines showing on all wings beyond black discal points, on hind wing the outer emphasized with black points on veins.

Fort Yuma, Ariz., April 4th. Belonging near *H. neo-mexicana*, Hulst. Type in National Museum at Washington, D. C., No. 3927. Another specimen taken at light in April is smaller, somewhat darker, and without reddish on fore wings.

ERSEPHILA INDISTINCTA, n. sp.

Expands 35-40 mm. Some time since, Trans. Am. Ento. Soc., Vol. XXIII., p. 291, I described *Ersephila grandipennis*. I am convinced I have two species under that name, and now separate them, calling one of the forms *E. indistincta*. The two species approach each other very closely, but *E. indistincta* is smaller as a rule, and has the darker colour of the wings forming into two bands, one basal and the other beyond the cell, both quite even in width. *E. grandipennis* is much more diffuse, the bands not shown, the cross lines more angulated, and the lines themselves more distinctly outlined. *E. indistincta* has the antennæ of the ♂ more distinctly bipectinate than *E. grandipennis*, and the wings are generally somewhat tinged with brownish.

The specimens of *E. indistincta* are from Colorado and Washington; those of *E. grandipennis* from Colorado only.

XANTHORHOE GLACIALIS, n. sp.

Expands 34-36 mm. Very much resembling *X. nemorella*, Hulst, and quite possibly a variation of that northern species. The ground colour of the fore wings is, however, ochreous stained with fuscous, the cross band is broader, especially at inner margin, and the outer edge, with a large angle strongly projected outward at space between veins 4 and 5, and there is a submarginal row of fuscous spots somewhat triangular in shape, and intervenular in position. There is a faintly showing broad central band on hind wings. Below dull ochreous, with the lines bordering bands showing distinctly on all wings.

Alaska. The Museum type number is 3925.

XANTHORHOE LONGULA, n. sp.

Expands 34-36 mm. Close to *X. glacialis*, Hulst. Fore wings pointed, even light ochre, or buff ochre with the colour deepening into a faint broad central band with faint ochre shadings and fine lighter cross lines, the band reaching out more prominently between 3 and 4, and between 4 and 5; the apex and margin somewhat fuscous stained, and a blackish marginal line. Hind wings fuscous ochre, or becoming bright ochre outwardly. Beneath almost even, light fuscous ochre varying to more or less ochre.

"Berring Island." My specimens are females, but the relationship seems to be so close to *X. glacialis*, Hulst, that I have little doubt as to generic oneness. I would not be at all surprised if they were ascertained finally to be variations of one species. The Museum type number 3926.

MONOTAXIS, n. gen.

Palpi moderate, porrect, end member very small; tongue strong; front scaled, quadrate, slightly protuberant; thorax and abdomen untufted; fore tibiæ unarmed; hind tibiæ with two pairs of spurs, not swollen, without hair pencil in ♂; antennæ unipectinate in ♂, pectinations long, end simple, in ♀ unidentate; fore wings even, rounded, without fovea in ♂ below, 2 accessory cells, 12 veins, 3 and 4 widely separate, 5 near middle of cell, 6 at a point with 7 at end of cell; hind wings 8 veins, without fovea, vein 5 near middle of cell, 6 and 7 stemmed, 8 joined with cell nearly its whole length.

So far as I know the first American Geometer with unipectinate antennæ, though these are found in the Australian regions. But there the form with 8 joining the cell in hind wings is extremely rare. I do not consider it in anywise but as one of the *Hydriomenida*, though it may be placed in a subfamily by itself.

MONOTAXIS SEMIPECTINATA, n. sp.

Expands 35-40 mm. Palpi and front dull black; thorax dark mouse colour; abdomen lighter; fore wings of a quite even dark fuscous, with a mouse colour tinge, this deepening into a rather broad median band, faintly indicating parallel wavy lines; beyond this, first a white and then four dark lines are indicated by fine dots of these colours on veins; an outer faint whitish line, mostly evident between veins, wavy; marginal line broken, blackish; discal spots faint; hind wings even mouse colour fuscous, deepening outwardly. In the ♀ all the colours are the same, but lighter fuscous, and without the mouse colour shading, but the single specimen has an appearance as if faded. Beneath even mouse colour fuscous, blackish on basal half along costa on fore wings, with some ochre tinging near apex; ♀ lighter. The whole insect has much the markings of *Philereme californiata*, Pack., and much the colour of that species with the mouse colour shading added.

Fort Grant, Ariz., July 23. In National Museum, No. 3928. The female in my own collection from Arizona without definite locality, but probably from either Prescott or Phoenix.

MYCTEROPHORA SLOSSONIÆ, n. sp.

Expands 24 mm. Palpi black and fuscous mixed, nearly black towards end; front black-tufted; thorax fuscous ochre, mixed with black in front, blackish behind; abdomen blackish, interlined with fuscous; fore wings fuscous gray to fuscous, with a slight ochre tinge more or less

heavily overlaid with black; the ground colour shows in a broad costal band, reaching nearly to apex, and extending posteriorly to cell; the extreme edge of costa being checkered with blackish; the whole space of the wing covered with blackish has the fuscous ground colour showing more or less distinctly in numerous scalloped parallel lines, a basal, extra discal, and outer being more especially distinct; a scalloped marginal line, black; hind wings corresponding in colours and lines with fore wings, the discal line forming a row of dentate black lunules; beneath in general appearance as above, the lines less distinct or obsolete, the blackish emphasized in a middle and outer rather broad band.

White Mountains, N. H.; from Mrs. Slosson. Winnipeg, Man.; from Mr. Hanham. The insect has superficially the appearance of a small *Homoptera*.

SYNELYS NIGROCANDIDA, n. sp.

Expands 25 mm. Palpi and front black; summit pure white; collar narrowly blackish; antennæ white, somewhat blackish stained above, especially towards end; thorax pure white; abdomen white, faintly stained with blackish. Wings pure snow white; fore wings with black specks at cell and at inner margin, suggesting a basal line; outer line well out, fine, jet black, much waved and angled, obsolete at costa; beyond this on posterior half, jet black scales forming four incomplete black spots; hind wings without basal line; outer line corresponding to line on fore wings with corresponding submarginal black scales and dots; discal spots distinct, jet black on all wings; margin with jet black intervenular points; hind wings with black scales along inner margin. Front wings rounded; hind wings slightly wavy, scarcely angled. Beneath dull white; a row of black points on veins in place of outer lines, these more faint on hind wings; discal joints and margin as above, not so distinct on hind wings.

Ormond, Florida; from Mrs. Slosson. A very pretty insect with sharply contrasting black and white, much suggesting *S. alabastaria*, Hubn., but slighter, with colours more vivid, and hind wings less angled. I have seen the ♀ only.

ROYAL SOCIETY OF CANADA.—The seventeenth general meeting of this Society will be held at Ottawa, in the Normal School Building, on the 25th of May, beginning at 10 o'clock a. m. The Presidential address by the Hon. F. G. Marchand, Prime Minister of Quebec, will be delivered that evening. Mr. J. D. Evans, of Trenton, is the delegate from the Entomological Society of Ontario.

NOTES ON SOME ONTARIO ACRIDIIDÆ.

BY E. M. WALKER, TORONTO.

As so little is known of the Orthoptera of Canada, the following notes on the species of Acridiidæ, which I have taken in Ontario, may prove of some value. They are by no means intended to form a complete list of the species found in Ontario, but only of those which have come under my own observation.

The great majority of my specimens were taken from but two localities—Toronto, and the vicinity of DeGrassi Pt., Lake Simcoe, about fifty miles farther north. Although so near each other, the entomological fauna in these two localities differs somewhat; many forms common on the Niagara peninsula and southward being found as far north as Toronto, but not extending to Lake Simcoe, while several northern forms have their southern limits, at least in Ontario, about Lake Simcoe. But although the collecting grounds in both these places are very rich and varied, there are no doubt a number of Ontario species not represented in either. The great Archæan region forming the northern and greater part of Ontario has been but little explored from an entomologist's standpoint, and possibly many interesting species occur there, while there are doubtless southern forms not yet recorded from Canada whose range extends into the Niagara peninsula.

My thanks are due to Mr. S. H. Scudder, Mr. A. P. Morse, and Mr. W. S. Blatchley for the determination of doubtful species.

I.—TETTIGINÆ.

1. *Tettix ornatus*, Say.

Acrydium ornatum, Say; Amer. Entom., 1824, I., pl. V.

Tettix ornata, Say; Scudd., Mat. Mon. of N. A. Orth., 1862, 474.

“ *dorsalis*, Harr.; Ins. Inj. to Veg., 1862, 186.

“ *quadrinaculata*, Harr.; loc. cit., 186.

“ *bilineata*, Harr.; loc. cit., 186.

“ *ornatus*, Say; Fernald, Orth. N. E., 1888, 46.

Form, *triangularis*, Scudd.

Tettix triangularis, Scudd.; Mat. Mon. N. A. Orth., 1862, 475.

This species is the commonest member of the subfamily occurring about Toronto and Lake Simcoe. It frequents the damper parts of pastures, wet ditches, etc., and is also found, especially the short-winged form, *triangularis*, in quite dry, sandy or gravelly uplands. Though generally found in the neighbourhood of woodlands, it does not seem to

penetrate into their depths, where *T. granulatus* frequently occurs. The short-winged form is generally found in drier places than the long-winged form. In fact, I do not remember ever to have taken the former in boggy places at DeGrassi Pt., although the long-winged form is quite common in such spots. On the other hand, in a certain dry, sandy pasture at DeGrassi Pt., *triangularis* is quite numerous, whereas the long-winged variety is scarcely ever met with.

My Toronto specimens were taken between April 20th and June 17th, and again in September; while those captured at Lake Simcoe were captured between August 15th and September 25th, and also a few on May 2nd, 1896.

2. *Tettix granulatus*, Kirby.

Acrydium granulatum, Kirby; Faun. Bor. Am. Ins., 1837, 251.

Tettix granulata, Kirby; Scudd., Mat. Mon., 1862, 474.

Tettix ornata, Harr.; Ins. Inj., 1862, 186.

Tettix granulatus, Kirby; Fernald, Orth. N. E., 1888, 46.

Though less common than the preceding species, this form is frequently met with, and, as a rule, is found in more thickly wooded places, often a considerable distance from any clearing. It is also common on the boggy margins of slow streams, and a favourite haunt at Lake Simcoe is the swamplier parts of the shore where a large amount of decayed wood collects. It is not often found in damper portions of otherwise dry pastures, where *T. ornatus* frequently abounds. It is common both at Toronto and Lake Simcoe, and also in the Muskoka district, and probably ranges a long distance northward and westward in Ontario, as I have taken it at Winnipeg, Man. I have captured full-grown specimens in every month from April till September, but mostly in April, May and August.

3. *Paratettix cucullatus*, Burm.

Tettix cucullata, Burm., 1838, Handbuch, II., 658.

Tettix cucullatus, Scudd.; Fernald, Orth. N. E., 47, 1888.

Paratettix cucullatus, Morse; Psyche, Vol. VII., 163, 1894.

This species is somewhat local, though sometimes very abundant where it occurs. I have found it on the sandy margins of streams near Toronto, and it is but seldom seen away from such situations. I have never seen it at Lake Simcoe. My specimens, with one exception, were taken in the months of May and June, most of them in the latter. The exception referred to was a male taken on a wet clay bank, on February 18th, 1897, which was an unusually warm, spring-like day for the season.

4. *Tettigidea parvipennis*, Harr.*Tetrix parvipennis*, Harr.; Ins. Inj., 1862, 187.*Tettigidea polymorpha*, Burm.; Scudd., Mat. Mon., 1862, 477." *parvipennis*, Harr.; Morse, Psyche, VII., 1896, 324.Form, *pennata*, Morse.*Tetrix lateralis*, Say; Harr., Ins. Inj., 1862, 187.*Tettigidea lateralis*, Say; Scudd., Mat. Mon., 1862, 477." *parvipennis pennata*, Morse; Psyche, VII., 1896, 325.

A common species in Ontario and has similar haunts to those of *Tettix granulatus*. The edges of roads cut through swampy woodlands are favourite resorts, but it is frequently found in other wet places. Like *Tettix granulatus*, it is also often found in deep woods, when these are of a more or less damp character.

The short-winged form is more often seen than the long-winged form, but both are quite common. On April 12, 1895, I found a ♀ *pennata* hibernating in a beetle-boring in a log. The hole was completely concealed by the bark.

My specimens were taken between the beginning of April and June 21, and again in August and September.

II.—TRUXALINÆ.

5. *Chloealtis conspersa*, Harris.*Locusta (Chloealtis) conspersa*, Harr.; Ins. Inj., 1862, 184." " *abortiva*, Harr.; loc. cit., 184.*Stenobothrus melanopleurus*, Scudd.; Bost. Jour. Nat. Hist., 1862, Vol. VII., 456.*Chrysochraon conspersum*, Harr.; Thos., Syn. Acrid., 1873, 76.*Chloealtis conspersa*, Harr.; Thos., Ninth Rep. State Ent., Ill., 1880, 99.

This species is rather common on the borders of woods in summer, the males hopping about on the dead leaves, with which their colour closely harmonizes, and the females squatting on logs and old fences upon which they deposit their eggs. Mr. C. T. Hills gave me a short stick of dead, though sound, sumac, upon the end of which he found a female in the act of boring. The hole was 16 mm. deep, but no eggs had been deposited.

It first appears in the imago state late in June, or early in July, and continues through the summer till September. In the earlier part of the

season the males seem to be more abundant than the females, but during the latter part of the season the reverse is the case.

I have two females of the full-winged form, *prima*, Morse (Psyche, VII., 1896, 420). In one specimen the tegmina project beyond the tip of the hind femora by about one-fourth their length, and the wings are quite ample; in the other they just reach the tip. Both were taken at Lake Simcoe.

I have specimens from Nepigon, Lake Superior, Aug. 27, 1897; Kingsville, Aug. 24, 1897 (C. T. Hills); Clear Lake, Peterborough Co., July 7, 1897; Toronto, and DeGrassi Pt., Lake Simcoe.

6. *Orphula aequalis*, Scudd

Stenobothrus aequalis, Scudd.; Bost. Jour. Nat. Hist., 1862, Vol. VII., 459.

Stenobothrus bilineatus, Scudd.; loc. cit., 460.

Orphula aequalis, Morse; Psyche, VII., 1896, 409.

This is a very local species with us, though plentiful enough where it occurs. I have taken it in dry, sandy pastures at Toronto, and DeGrassi Pt., Lake Simcoe. The males are for the most part of the brown form, the females of the green; but the proportion seems to vary according to the locality. For instance, at DeGrassi Pt. about one-third of the males seen have more or less green in their coloration, while only very few brown females are found; whereas at Toronto the proportion of brown individuals in both sexes is much greater.

It appears in the perfect state from the latter part of July until the beginning of October.

7. *Mecostethus lineatus*, Scudd.*

This large, handsome insect is quite plentiful in Ontario in low, wet, sedgy meadows bordering lakes and slow streams, but is very shy and difficult to approach, and does not generally remain where it alights, but moves quickly through the reeds and sedges to another spot some distance away.

It is quite common about Lake Simcoe, less so at Toronto. I found it in great abundance on the borders of a small lake near Aurora, Ont.

It appears in the perfect state from about the middle of July until late in September.

*For Synonymy see page 55.

8. *Mecostethus gracilis*, Scudd.

Arcyptera gracilis, Scudd.; Bost. Jour. Nat. Hist., 1862, VII., 463.

Stetheophyma gracilis, Thos.; Syn. Acrid., 1873, 99.

This species is found in precisely the same habitats as the preceding in Ontario, but in the West, at Winnipeg, Man., I have also taken it in prairies which were quite dry. It is not a very common species here, though by no means rare.

All my specimens were taken in August, though it is probably found throughout the season in which *M. lineatus* occurs. I have seen it at DeGrassi Pt. and at Aurora.

9. *Stenobothrus curtipennis*, Harris.

Locusta (Chloealtis) curtipennis, Harr.; Ins. Inj., 1862, 184.

Stenobothrus longipennis, Scudd.; Bost. Jour. Nat. Hist., 1862, Vol. VII., 457.

Stenobothrus curtipennis, Harr.; Thos., Syn. Acrid., 1873, 91.

A very common grasshopper in low, wet meadows, clearings in swampy woods, etc. Probably found throughout the whole of or at least by far the greater part of Ontario. Both the long- and short-winged forms are common.

It comes to maturity about the first of July, or in some seasons a little later, and is found until about the beginning of October.

NOTES ON THE NOCTUID GENUS *HYDRÆCIA*.

BY HENRY BIRD, RYE, N. Y.

Descriptions of several *Hydræcia* larvæ have appeared in this magazine at various times, but as they were instances when the insects were infesting cultivated plants, the following notes are submitted to show their life history when found in more natural environments, and to assist the student in obtaining sufficient material in some of the species for comparative work. From the paucity of examples in collections and from the close relationship existing between most of the species, it is necessary to resort to breeding, or at least to have such a knowledge of their early habits as to secure extended series, before a very correct idea may be had of the representatives of this genus.

Since Mr. Grote worked over the group [*Hydræcia*, Guen. ; *Gortyna*, Ochs.], describing as new many of the species, very little practical work has been done. He described from scanty material, and although his writings seem sufficiently lucid, the construction given some of his

species to-day points to a very mixed condition of opinions. Hence, an opportunity offers where a little light may be shed, and at the same time most interesting work afforded the student.

It is not necessary to go into all the details of the breeding cage in order to get a quantity of specimens in perfect condition. A knowledge of food plant and a few exact dates save much of this bother. *Hydracia* larvæ bore in the stems and roots of annual and perennial plants and having once located in a plant attain their full growth and pupate in their burrows. True, they are at all times concealed, but a little experience soon enables one to locate them, and if the pupal change has occurred, a section of the plant enclosing the pupa may be removed, and can be placed in some convenient box to await the emergence of the imago. The waiting time will not overtax one either, being for the species here mentioned, a period of from fourteen to thirty days.

There seems a decided indifference to food plant expressed by the common species; almost any thick-stemmed plant coming in their way is accepted. Possibly it is as much a case of necessity as of choice, for it seems probable that oviposition must be somewhat broadcast, at least when the annuals are infested. The female moth appearing in September certainly could not apprehend the site of an annual of the following summer, and it follows that the larvæ must in a measure look out for themselves. The characteristic points of the species here enumerated are compiled from my notes covering half a dozen years' observation. Of the other species taken in this locality my observations are less complete.

Hydracia nitela, Gn.—This is the most familiarly known species, by reason of its wide distribution, and its larval history has been well worked out by the economic entomologists. It flies willingly to light, and is by far the commonest species that one may obtain from this source at Rye. Its food plants are numerous. The most preferred seems to be ragweed. The larva may be located by examining the plant stalk for one or more small holes through which the excrements fall to the ground, and by the presence of the latter around the base of the plant. The larvæ work upward twenty inches or more according to the size of the plant, and as occasion requires make several small holes in the stalk. If full growth is attained, a larger opening, one-quarter of an inch in diameter, will be made for the moth to escape. This is their last act before changing. Occasionally two larvæ are found in a plant. It seem very prone to parasitic attack. For convenience of comparison I give a description of

larva. Mature larva: Length, 1.6 inches; very cylindrical. Colour livid, mars brown; darkest on first four and last three segments. Head shining, brown; mandibles black, as are the true legs. On side of head is a black line which has a continuation on the thoracic shield. The latter a lighter shade of brown than the head and merges into black where it meets the line mentioned. A dirty white stripe extends along dorsum. A similar stripe on subdorsum, but is lacking on first four abdominal segments. On either side of this line on each segment are two minute black dots, and two more near each spiracle that are also black. Anal shield shining; dark brown. Begins to pupate August 16; to emerge, September 12. There seems a variation in the larva of the form *nebris*, but I am not prepared to speak with certainty concerning it at present.

Pupa is cylindrical, longer than usual compared with its diameter, varies greatly in size according to sex; the average is about .75 inch in length. Cremaster not prominent, composed of two divergent spines. Wing-cases slightly creased, moderately prominent. Colour light brown. Pupa is always found below opening for moth's emergence, frequently down at the bottom of burrow.

Hydræcia cataphracta, Grt.—In the search for larvæ here at Rye this species is everywhere found in numbers. At light the imago would be classed a rarity. Preferred food plants are burdock and thistle. Two or three specimens are often found in the former plant, as the branches, as well as the main stalk, offer sufficient substance for their work. When working in thistle but one will be found. The presence of larva in burdock can be detected quite easily by the unhealthy appearance of the plant and by the evidence at the base of stalk. When in thistle the larva keeps well up to near the top, for the plant becomes hollow from the ground up to the main branches, but is solid above. Infested plants may be detected from afar by the top part of the plant having died and fallen down to one side, the walls of the plant being so thin that the larva's work has caused a collapse of the portion above it. Pupa will be found near this break; of course, always below.

When a hole is made for the moth to escape, the inner substance is eaten away to the cuticle. When this skin that is left dries it shrinks and pulls away on one side, but still hangs as a screen against intruders.

Besides ichneumon enemies, there are other casualties that affect the mortality of this species to a considerable extent. When feeding in burdock the plant frequently dies prematurely, and becoming dried, shrinks

and pinches the chrysalis so as to kill it. In thistle the pupa is more exposed from having the stalk broken off above, and suffers from the attack of those species of ants that are always ascending plants in search of aphides.

One will frequently find in thistle, under conditions similar to those produced by *cataphracta*, a weevil, whose workings will require no little experience to distinguish from the caterpillar's by a first glance at the plant.

Mature larva: Length, 1.5 to 1.7 inches. Bodily anatomy and marking almost identical with *nitela*, but is much lighter in colour and more mottled. Is very active when disturbed in its burrow, and can go backward as rapidly as forward.

Begins to pupate Aug. 19; to emerge, Sept. 17. Pupa similar to *nitela*, but as a rule somewhat larger.

Hydræcia purpurifascia, G. & R.

Mr. Slingerland's article in CANADIAN ENTOMOLOGIST, Vol. XXIX., 161, relative to finding this species boring in cultivated Columbine, suggested to me that the wild variety might be a more natural food plant. An investigation showed my theory to be correct. But it is the root in this instance that is attacked, the plant stalk not offering a sufficient substance. The roots are surprisingly large and tuberous where the plant grows in favourable locations. The larvæ consume the inner part of the root completely, leaving only the outer skin tissue, which resembles the wrapper of a small cigar when they get through with it. These empty root skins are the only evidence one has to work upon in locating the pupa, as the plant shows no outward sign, and to find this evidence it is necessary to dig. That is all there is to it—one must dig. It is useless to mind soiled hands and frequent disappointments; if proof against poison ivy, it is a large factor in one's favour. Having once located a larva, the surrounding leaf mould must be examined carefully, as they seldom pupate in their burrows, and if the search has been thorough you may find a pupa or you may not. The latter often in the majority. It frequently happens there have been visitors before. Ground moles are early callers after the caterpillar has transformed, and fragments of the pupa shell where they have tunnelled under a plant tell how the spoils always fall to the lot of the earliest bird. Fortunately for the collector, Columbine grows in all sorts of seams and clefts of rocks, and it is here, where the plants are inaccessible to the mole, that one may search with

profit. In one locality examined it was estimated the moles had eaten seventy-five per cent. of the pupæ, but to appreciate their skill fully one should see a place where they have been at work. It would almost seem unnecessary for any ichneumon enemies to infest this species to keep it in check, but there are a good percentage notwithstanding. Fifteen pupæ out of probably three hundred plants examined last summer, produced five hymenopterous parasites, so that at this rate one-third the number passing all other casualties are still doomed. No wonder that *purpurifascia* is rarely seen!

The description of the imago (Trans. Am. Ent. Soc., I., 341) is admirably drawn. Had Mr. Grote been familiar with its early history, he might have hesitated before applying a new name, or at least would have made a change in the synonymy relative to *Gortyna leucostigma*, Harris. As his opinions changed he cited *leucostigma* under *cataphracta*, *rutila* and *Harrisii*. Harris describes the entire life history of *leucostigma* (Ins. Inj. to Veg., 440), and in the sense of a superficial description it tallies with *purpurifascia* in description of larva and moth, date of emergence, and food plant, so as to leave scarcely a questionable doubt but that the two are identical. *Leucostigma* has priority, but will have to fall from being a preoccupied name in the European fauna. All this may seem of little importance with us, as it can make no change in the lists, but to the student it is essential to know just what the early writers had before them when describing.

This is shown in that so able an authority as Mr. Grote must have repeatedly puzzled over the matter in making so many changes of synonymy.

Mature larva: Length, 1.3 to 1.5 inches; very cylindrical, flesh-colour, no stripes or mottlings. Head and shield concolorous, testaceous, shining. Shield edged on side with black. There are a number of shiny black dots, placed as in the preceding species, but are a trifle more conspicuous by reason of the lighter ground colour. Anal shield prominent, black. Spiracles black, as is an accompanying row of dots. Pupates from Aug. 15 to 21; emerges, Sept. 10 to 24.

Pupa: Length, .8 inch; active, shiny, light brown. Becomes darker at hatching time, and the white spots on primaries, typical of *Hydræcia*, may be plainly seen through the pupa shell. Moderate spur at anal extremity. Under a glass this spur is seen to be made up of two separate projections. Tapers posteriorly rather more than in preceding species.

Hydræcia necopina, Grt.

The early history of this species seems never to have been worked up, and the mature insect is rarely seen in collections. It has never been taken at light or sugar during thirty years that lepidopterists have collected here. In passing it may be remarked that there has been no instance in my experience where a *Hydræcia* (from *inquæsitæ* to the end of the list) has been taken at sugar. The insignificant tongue would indicate a limited food supply being taken, and should offer an argument that they are not hibernators. Some years ago the insect was met in its early stages. Fifty or more pupæ have been gathered each succeeding year, but it still remains for me to see the moth in flight.

The food plant is wild sunflower (*Helianthus* —), which grows in abundance at Rye. This plant thrives where the uplands and salt marshes meet, growing up many successive years from the same root, so that a locality once infested may be counted on to furnish examples for many seasons still to come. As this species of sunflower, which is quite close to the artichoke, grows six or seven feet high, there is ample opportunity for extended mining. The insect, however, only operates at the base of the stalk, and its work causes a gall-like excrescence to form that is about twice the diameter of the plant. This does not affect the growth, however, and one must examine for the galls, which is an easy matter in searching for this species. If the time for pupation has arrived an opening for the moth's exit will have been made. This is the caterpillar's last act preparatory to changing, and the presence or absence of this exit aperture, if after the time pupal change should occur, indicates whether you are dealing with a healthy or an ichneumonized example. If the larva has become a prey to some of its parasitic enemies its life will have ended before it reached full growth and no exit opening will be made. *Necopina* is a better artisan than *cataphractæ* in hanging a protective lid at the exit door. This opening has to be of good proportions, and the larva eats away the substance of the stalk to the epidermis, making slight perforations through the latter around the edge. The epidermis on drying shrinks and hangs hinged at the top where no perforations were made. As a matter of fact, you will seldom find this lid intact, especially if it is much after the pupal change; the reason for this being the host of visitors that seek shelter within these burrows. Those ubiquitous myriapods which pass muster under the common name "sow bug" are the most numerous. To these may be added leeches,

ants and snails. It is not unusual to find upon opening a gall that the pupa is wriggling about in a mass of myriapods to the number of thirty or more, but as they do not attack the chrysalis their presence does not seem to be especially detrimental. As *purpurifascia* has a destructive enemy in the mole, so *necopina* has a chief foe in the field mouse. The mice dexterously tear out the side of the gall, eat the pupa, and hurry on to another, going over a large territory in a single night. It is only a pupa diet that suits them. The galls are never disturbed until after the pupal change. They are experts too at their trade. I have examined scores of demolished galls, but not once was a gall broken open that did not have the exit aperture made for the moth; in other words, never a gall that was parasitized.

Mr. Grote's description of *necopina* (CAN. ENT., VIII., 25) is rather limited by reason that there is so little of pattern to dwell upon, and his material was not plentiful. All that may be added is that the transverse posterior line on primaries may be traced on fresh specimen. It is most plainly seen at the internal margin, and can be seen in some examples extending to the costa. There is a slight sexual difference in colour, the male shading more slightly olivaceous than the female. There seems to be very little difference in size between the sexes, the usual disparity so generally shown in *Hydræcia* has not been noticed in my experience with this species. *Necopina* reminds one slightly of some of the genera which follow, *Bellura*, for instance, but there is no indication of a clypeal projection. The thoracic tuft behind collar is very prominent, and when at rest is projected forward at times, reminding one of *Cucullia*. On emergence from the pupa it is, of course, of the most importance that an exit be made at once before the wings have expanded, and for some time afterwards the moth exhibits the greatest restlessness, crawling in nervous haste from one point to another, always toward the light if in darkened quarters.

Mature larva: Length, 1.7 inches, smooth and of the greasy appearance common to boring larvæ. Body thicker perceptibly in the middle, and is a more robust larva than the preceding. Colour, dirty white. Head and shields testaceous, dark at the sides. Spiracles black; true legs dark brown, pro-legs concolorous with body. On each segment are a number of testaceous dots, larger and more conspicuous on the fourth, fifth, and last segments. Under a glass a few minute hairs may be seen. Along the dorsum beneath the skin may plainly be seen the internal

fluids pulsating through their canal, giving the appearance of a faint stripe extending the length of the body. Begins to pupate Aug. 24; to emerge, Sept. 22.

Pupa is 1.1 inches long, very active, and is able to move the anal segments to a greater angle with axis of the body than the preceding species. Slightly larger in the middle, tapering quite sharply to extremity, where the cremaster is made up of a two-pointed spur. Antennæ, eyes, and legs show out prominently; wing-cases faintly corrugated. There is a distinct prominence on front of thorax indicative of the large tuft; this is a strong specific character. Directly below, between the antennæ, is a much smaller projection, consisting of two separate points, that shows an approach to the striking clypeal armature of the *Nonagria* pupæ. Colour is brown, wing-cases a shade darker, becoming almost black at time for emergence. It is well to let a moth remain a day after hatching before mounting on the setting-board. *Necopina*, in common with the imagoes of most boring species, is prone to become greasy; in fact, this species is "up head" in this respect, oftentimes being an unsightly object before dry enough to be placed in the cabinet.

Larvæ begin to pupate Aug. 23; the first emergence out of forty pupæ was Sept. 23.

To sum up the factors for success with these species, we may sift from the foregoing notes the following:

Locate the larvæ or an infested locality, and by a reference to the dates given, a diligent search at the proper time will meet with its reward. It may be hard to get ahead of ichneumon and other insect enemies, but we can be the first *vertebrate* on the scene, which will mean a great deal in the aggregate of the specimens obtained.

A representation of this genus in any near degree to completeness will be an addition to any collection of Noctuidæ most pleasing to the owner, and doubly so if that addition is the fruit of individual labour in the field.

THE COTTONWOOD SNOW-SCALE OF NEBRASKA.

CHIONASPIS ORTHOLOBIS BRUNERI, subsp. nov.

Chionaspis ortholobis, Ckll.; Canad. Entom., 1894, pp. 189-190.

The *Chionaspis* from Nebraska, sent to me by Prof. Bruner, was named in MS. in 1894 *C. Bruneri*, but for reasons stated at the place cited the name was suppressed. Mr. R. A. Cooley, who is doing such good work in *Chionaspis*, now confirms my original opinion as to the distinctness of *Bruneri*, except that it is still an open question whether it is a good species or only a subspecies. For the present the insect may stand as above named.

T. D. A. COCKERELL.

NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.—II.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

Brachynemurus niger, new species.

Female.—Length, 29 mm.; expanse of wings, 56 mm.; greatest width of anterior wing, 7 mm.; length of antenna, 4 mm. Black, marked on head and thorax with luteous; sparsely hairy, more distinctly so on prothorax and abdomen.

Face scarcely convex, luteous, a transverse, shining black band above which extends upward so as to cover the inter-antennal area; this band is notched below, a black line extending from the notch almost to the clypeus; on either side, between face, clypeus and inner orbit of the eye, a triangular black dot. Circumocular area mostly luteous, except along vertex, where it is piceous. Clypeus luteous, on each side anteriorly an impressed dot. Labrum transverse, rounded laterally, emarginate in front, luteous, darker on emargination where it is sparsely clothed with black hairs. Mandibles piceous, black at tips.

Maxillary palpi of moderate length, piceous, with luteous articulations; first two joints short, about as broad as long, subequal, pale; third joint a little longer than first and second together, somewhat curved; fourth joint a little shorter than third; apical joint as long as third, subcylindrical (a little enlarged before apex), black, its tip truncate, luteous.

Labial palpi much longer than maxillary, piceous, with pale luteous articulations; first joint short, about as broad as long; second joint nearly three times as long as first, curved in basal half; apical half darker, widened and flattened, concave on inner side; apical joint greatly enlarged, fusiform, clothed with black hairs, shining black on inflated portion, the sharply-pointed tip luteous; an ocellus-shaped organ* on apical third of inflated portion externally.

Maxillary palpi† piceous, the anterior joint interrupted in the middle with luteous. Labium luteous, piceous at base. Labial palpi luteous, each with a black semicircle. Mentum luteous, with a transverse black line or series of dots, behind which rises a long black bristle. Gula luteous.

Antennæ clavate, somewhat shorter than head and thorax, black,

*This organ is present in all American Myrmelionidæ I have seen.

†I apply this term to the angular, elevated pieces from which the maxillary palpi spring.

paler at articulations, clothed with very short dark hairs or bristles ; two basal joints piceous, margined apically with luteous ; basal joint set in a luteous ring.

Vertex elevated behind, rounded, luteous ; post-antennal area fuscous, thinly clothed with white and black hairs ; elevated portion marked by two transverse black bands, the anterior of which is narrow and shining, forming a ridge on each side, posterior band spread out each side to form two large, somewhat triangular spots, and connected with the anterior band by the black longitudinal median furrow ; behind this furrow is a median oval black spot, longitudinally divided by a faint luteous line.

Pronotum as broad as long at base, narrowed anteriorly, truncate in front, sparsely clothed with white and black hairs, especially on margins ; black, a narrow longitudinal median line, which is enlarged at the transverse furrow, and one each side, luteous. Lateral carinæ luteous. Beneath luteous, margined on each side with black.

Mesonotum black, lobes not strongly elevated ; anterior lobe with a spot each side near front margin and a longitudinal median line, luteous ; this line is interrupted before the posterior lobe, but continued upon the latter ; another longitudinal luteous line each side (probably a continuation of the spots on anterior lobe) extending to the posterior margin, which is also luteous ; a few spots of similar colour on each lateral lobe ; posterior lobe shining black, except where marked by luteous as mentioned above. Below black, marked with luteous, especially on sides ; sparsely clothed with white hairs.

Metathorax black, with luteous markings similar to those of mesothorax, but no median line on posterior lobe and fewer spots on lateral lobes ; posterior lobe not shining.

Abdomen shorter than wings, rather slender, clothed with white hairs, more thickly at base. Black ; segments (except one or two basal ones) marked on dorsum each side, in middle and at apices, with a luteous spot ; these spots are more pronounced on the apical segments.

Tip clothed with long black hairs ; below a transverse double row of coarse black spines and two short, cylindrical, brown appendages clothed with long black hairs ; a short brownish plate between the latter at their base.

Legs of moderate length, yellow, thickly sprinkled with black ; beset with many black and white spines. Posterior femora almost entirely

black. Tibiæ black at their apices, posterior ones also with a transverse black line of confluent spots externally; spurs slightly curved, a little longer than first tarsal joint, rufo-piceous. Tarsal joints black at apices, the third and fourth entirely so; claws moderately curved, a little more than half the length of last tarsal joint, rufo-piceous.

Wings hyaline; posterior margins slightly sinuate near apices. Pterostigma luteous, black on inner half; before it, several intercostals of anterior wings and a few of posterior, forked. Veins clothed with dark hairs; the costa mostly luteous, the other veins fuscous; the subcosta of both wings and median vein of anterior interrupted, between transversals, with luteous; some other veins, including transversals, also interrupted with luteous.

Anterior wings with a few apical transversals behind median vein clouded with fuscous, especially the one nearest the pterostigma; along basal portion of submedian vein a series of small fuscous spots forming an irregular, somewhat serrate line; an oblique fuscous streak, about 5 mm. to 7 mm. in length, runs from tip of submedian vein to near apex; half way between lower end of this latter streak and outer end of basal streak of submedian vein, an irregular fuscous spot; another fuscous spot or short streak runs obliquely upward from where the post-costal vein joins the hind margin; small forks near tip and hind margin fumose; posterior wings a little shorter than anterior, almost immaculate, except for a fuscous clouding on the extreme apical transversal below median vein, before pterostigma. Posterior borders of both wings fringed with dark hairs.

Type.—No. 3812, U. S. National Museum. One specimen collected at Fort Grant, Arizona, July 20, 1897, by Mr. H. G. Hubbard.

This species is readily distinguishable from others of similar size, colour and wing-markings by the length and size of the labial palpi. These latter, though not as greatly lengthened as in *B. longipalpis*, are considerably more so than in any other species of this genus that I have examined.

Brachynemurus quadripunctatus, new species.

Female.—Length, 24 mm.; expanse of wings, 49 mm.; greatest width of anterior wing, 6.6 mm.; length of antenna, 5.5 mm. Luteous, marked with dark fuscous; clothed with white and some black hairs, more distinctly so on abdomen.

Face scarcely convex, luteous ; above, a pitchy-black band separating the antennæ ; this band sends a median acute prolongation from the anterior border toward the clypeus ; furrow, between face and inner orbit of the eye, fuscous. Circumocular area luteous, except along the depressed portion of the vertex. Clypeus subhexagonal, luteous, on each side anteriorly an impressed dot. Labrum transverse, rounded laterally and narrowed anteriorly, emarginate in front, luteous, a few hairs on emargination. Mandibles piceous.

Maxillary palpi luteous ; first two joints short, about as broad as long, subequal in length, the first somewhat stouter than the second ; third joint somewhat longer than the first and second together, a very little curved, enlarged at apex ; fourth joint straight, a little shorter than third ; apical joint a little longer than third, rufo-piceous (except at articulation, where it is luteous) ; truncate and notched at tip.

Labial palpi somewhat longer than maxillary, luteous ; first joint short, not quite twice as long as broad, enlarged apically ; second joint about three times as long as first, somewhat curved, strongly widened and thickened apically, sparsely clothed with dark hairs ; on inner side at apex a perceptible concavity ; apical joint about same length as second, swollen, fusiform, luteous, clothed with dark hairs ; on the outer side, surrounding the ocellus-like spot, rufo-piceous ; apex narrowed, tinged with rufous ; tip truncate, slightly ~~notched~~.

Maxillary palpigers luteous, clouded with darker. Maxillæ luteous, tinged with rufous. Labium, labial palpigers, mentum and gula, luteous ; each side, next anterior portion of maxillary palpigers, a brownish area with some dark hairs.

Antennæ clavate, shorter than head and thorax ; luteous, darker apically ; clothed with very short dark bristles or hairs ; first and second antennal joints luteous, shining, a piceous spot or two at their bases. Between the antennæ posteriorly, a narrow, transverse luteous band.

Vertex elevated behind, rounded, luteous ; in front, just behind antennæ, a transverse, pitchy-black band ; in front, on elevated portion, a transverse, shining-yellow ridge ; behind this, four black dots in a transverse row.

Pronotum as broad as long at base, somewhat narrowed anteriorly, luteous ; anterior angles rounded, front margin truncate ; a longitudinal dark fuscous stripe each side near middle line ; on the outer side of each of these stripes another irregular dark fuscous stripe extending forward to

the transverse furrow ; in front of each of these latter stripes, near anterior margin, a fuscous spot. Lateral carinæ luteous. Below luteous, on either side, next carinæ. a dark fuscous streak, extending nearly as far forward as the dorsal transverse furrow.

Mesonotum luteous, with anterior, posterior and lateral lobes very strongly elevated ; anterior lobe with a broad, dark fuscous stripe each side near middle line ; anteriorly each of these stripes extends outward, then backward along the furrow, separating anterior and lateral lobes, thus forming an inverted U-shaped marking ; each lateral lobe has an elongate spot near middorsal line, and on the outer side of this an inverted "U," the ends of which nearly meet ; posterior lobe with a longitudinal dark fuscous stripe each side and a rather faint median one (sometimes wanting), the posterior margin with a dark dot medially ; posterior angles each marked by two longitudinal, dark fuscous stripes ; a few fuscous dots at place of attachment of anterior wings. Sides and beneath luteous, marked with fuscous.

Metanotum luteous ; the lobes distinctly elevated, but less so than those of mesonotum ; anterior lobe with a U-shaped, dark fuscous marking ; lateral lobes marked similarly to those of mesonotum ; posterior lobe with an inverted, heart-shaped, dark fuscous spot ; posterior angles fuscous, margined with luteous. Sides and beneath luteous, marked with fuscous.

Abdomen shorter than wings, luteous, a longitudinal median dark fuscous stripe above, narrowed or interrupted at articulations ; a similar stripe bounds the dorsum each side ; beneath luteous, a fuscous line each side and a good-sized fuscous spot in the middle of all but the basal segments.

Tip of abdomen luteous, above with long dark hairs ; superior part split, a transverse row of black spines at base ; inferior part beset with black spines ; below, two small cylindrical or slightly clavate luteous appendages, twice as long as broad and armed with dark spines or bristles, project from apex of last segment.

Legs of moderate length, luteous ; armed with some long, and numerous short, black and pale spines ; somewhat hairy. Tibial spurs as long or slightly longer than first tarsal joint, somewhat curved, rufo-piceous. Tarsal joints sometimes rufo-piceous at their apices, third and fourth especially so ; claws somewhat more than half the length of last tarsal joint, moderately curved, rufo-piceous.

Wings hyaline. Pterostigma luteous, on inner side and below margined with fuscous ; before it, a few intercostals in anterior wings and a less number in posterior, forked. Veins hairy ; costal veins luteous ; the other principal longitudinal veins luteous, interrupted with fuscous at junctures of transversals ; smaller longitudinal veins luteous, interrupted irregularly with fuscous ; transverse veins of costal series and some of the others luteous, the rest fuscous.

Anterior wings with a series of small fuscous spots on basal portion of submedian vein above, at junctures with transversals ; three larger fuscous spots at intervals along the apical two-thirds of this vein ; bases of a few small apical forks sometimes slightly fumose ; posterior wings a little shorter than anterior, unspotted. Posterior borders of both wings fringed with fine hairs.

Male.—Length, 36 mm. ; expanse of wings, 49 mm. ; greatest width of anterior wing, 6.5 mm. ; length of antenna, 6 mm.

Antennæ less clavate than in female. Abdomen one-fifth longer than anterior wings ; the markings on the apical segments heavy and more or less confluent ; appendages short, half as broad as long, one-half length of seventh segment (viewed from below), subcylindrical, obtuse on tip, luteous, sometimes clouded with, or almost entirely, fuscous ; clothed with coarse black spines ; between the appendages below, a very short, triangular, luteous plate.

Type.—No. 3813, U. S. National Museum. One female specimen collected in San Bernardino County, California, by Mr. D. W. Coquillett.

No. 3813a, U. S. National Museum. One male, taken at Phoenix, Arizona, June 1, 1897 ; from the collection of Mr. Chas. C. Adams.

Co-types.—One hundred and one females and seventy-two males taken at Phoenix, Arizona, in June, July and August, 1897, kindly loaned me for study by Mr. Chas. C. Adams, of Urbana, Illinois.

This unusually large and fine series of specimens exhibits some variations. In two of the females, and about the same number of males, the face and vertex are suffused with fusco-ferruginous, so that the fuscous markings are less apparent ; in a few specimens the band on upper part of face and its prolongation toward the clypeus are subobsolete ; in one male the face and clypeus have scattered fuscous spots in place of the usual markings. Small extra spots sometimes occur in the transverse row on the vertex, and two short longitudinal lines or spots are some-

times present behind the two middle dots of the row; the dots are occasionally connected by a narrow transverse fuscous line.

In a few specimens the third and fourth joints of the mixillary palpi are tinged with rufo-piceous, the second joint of the labial palpi is piceous apically, and the third entirely so.

The outer fuscous stripes of pronotum are in some specimens continuous to anterior margin, in others they end at the transverse furrow and are *not* indicated by spots in front of this furrow.

The inverted U-shaped markings on lateral lobes of mesonotum sometimes have their ends joined so as to form circles.

The tarsal joints are not always rufo-piceous at their apices.

CATOCALA ILLECTA, WALK.

In March last, Mr. E. N. Laing, of Essex, Ont., one of our young collectors, whilst on a visit to London availed himself of the opportunity to obtain the names of his captures. Whilst I was looking over his collection, a *Catocala*, with something quite unusual in its appearance to me, arrested my attention; and on comparing it with those in the Society's possession I found it was not there represented. Upon turning up Mr. Strecker's "Lep. Rhop. Et. Het." I found it therein vividly portrayed on Plate XI., fig. 9, and named by him *Catocala magdalena*. Not finding that name in Smith's list of 1891, I had to turn up the Synonymy, and found that it was known as *C. Illecta* of Walker.

It is a particularly attractive moth. Mr. Grote, in Trans. Am. Ent. Soc., Vol. IV., p. 13, says of it: "A broad-winged, moderately stout species, recalling *C. concumbens* in appearance and colour of primaries." This resemblance to *concumbens* is very striking, and has attracted the attention of nearly all of the describers. Walker gives the colour of the secondaries as "bright luteous, abdomen luteous"; Hulst., "bright yellow"; and Grote as "bright golden-yellow," which last seems to me to express it exactly. The yellow upper surface of the abdomen, corresponding to the colour of the hind wings, instead of the gray of the front ones, is very noticeable. Walker gives the habitat as "United States." Mr. Strecker's figure was drawn from an example taken at Indianapolis in 1874, but he afterwards received specimens from Texas. Dr. Hulst, writing in 1885, gives Ill. Neb. to Texas as its habitat; and Dr. Smith, as late as 1893, gives the same. So this discovery of *C. Illecta* is of some importance as considerably extending its range. Mr. Laing took his specimen of it in the season of 1896, at electric light.

J. ALSTON MOFFAT.

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No. 6.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

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(Paper No. 1.)

For many years past, those most interesting of Hymenopterous insects—the Horntails and the Sawflies—have received the closest study by some of the ablest Hymenopterists of the world. Cresson and Norton, in America; Newman, Westwood, Kirby, and Cameron, in England; Klug, Hartig, and Konow, in Germany; Lepeletier and André, in France; and Thompson, in Sweden, have all contributed much to our knowledge of these insects, and made decided improvements in their classification.

Mr. Peter Cameron, in his excellent Monograph of the British Phytophagous Hymenoptera, Vol. I., published in 1882, has given a thorough review of the progress made in the systematic arrangement of these insects; besides, on the completion of the work, some years later, gives a full bibliography on the subject; so that it is unnecessary here to repeat or enter particularly into this part of the subject, since this work is so easily accessible to the student.

I shall here, therefore, very briefly refer to Cameron's work on the group, and that of a later writer, Mr. F. W. Konow.

Mr. Cameron, in his work, made some decided improvements in the classification of these insects, and gave excellent tables for the separation of families and genera.

He recognized only four families: I. *Tenthredinidæ*, II. *Cephidæ*, III. *Siricidæ*, and IV. *Oryssidæ*, and some of these he again subdivides into subfamilies, tribes and subtribes.

The latest systematist to work in the group, a most prolific writer, and a profound and energetic student of these wasps, is Mr. F. W. Konow, of Teschendorf, who in the *Deutsche Entomologische Zeitschrift*, for 1890, proposed almost an entire new arrangement, besides giving a very unique and original method for showing the relationship of the different groups or tribes recognized by him.

In this paper, he considered the vast number of species, now known in the world, to belong to a single large family which he called the *Tenthredinidae*, and then separates it into three subfamilies as follows: i. *Lydetæ*, ii. *Siricetæ*, and iii. *Tenthredinetæ*. The *Lydetæ* he divides into four tribes: (1) *Lydini*, (2) *Cephini*, (3) *Pinicolini*, and (4) *Blasticotomini*; the *Siricetæ* into three tribes: (5) *Xiphydriini*, (6) *Siricini*, and (7) *Oryssini*; while the *Tenthredinetæ* he divides into four tribes: (8) *Cimbicini*, (9) *Argini*, (10) *Lophyrini*, and (11) *Tenthredinini*.

Many of these he again subdivides into subtribes, which agree in the main with some of the subfamilies of other authors.

Since this publication appeared, he has, in several very valuable contributions, still further elaborated his system, and in many clear and admirable tables has greatly enlarged our knowledge of genera and species.

The present status of Konow's systematic work in the group is probably well expressed in Dr. Von Dalla Torre's "Catalogue of the *Tenthredinidae*," representing Vol. I. of his *Catalogus Hymenopterorum*, published in 1894, and which, in the main, appears to be arranged in accordance with the views published by Konow, up to date of publication.

In this Catalogue, 18 subfamilies are recognized, arranged in the following sequence: (1) *Dolerinae*, Thomson, 1871; (2) *Tenthredinidae*, Newman, 1834; (3) *Selandriidae*, Thomson, 1871; (4) *Blennacampinae*, Konow, 1890; (5) *Hoplocampinae*, Konow, 1890; (6) *Nematinae*, Thomson, 1871; (7) *Lophyrinae*, Thomson, 1871; (8) *Pterygophorinae*, Cameron, 1878; (9) *Lobocerinae*, Kirby, 1882; (10) *Hylotominae*, Newman, 1834; (11) *Cimbicinae*, Leach, 1817; (12) *Oryssinae*, Newman, 1834; (13) *Siricinae*, Newman, 1834; (14) *Xiphydriinae*, Thomson, 1871; (15) *Blasticotominae*, Thomson, 1871; (16) *Xyelinae*, Newman, 1834; (17) *Cephinae*, Westwood, 1840; and (18) *Pamphiliinae*, Dalla Torre, 1894.

I have gone somewhat particularly into the present arrangement of these insects, and probably further than was really necessary as an introduction to the present series of papers on their classification: 1st, Because my own views are so at variance with other systematists; 2nd, Because I have recognized no less than 15 distinct families; and, 3rd, Because I have separated, quite widely, groups and genera that were previously placed together or in juxtaposition.

This separation will become more apparent in the articles that are to follow the present introductory paper, which will include synoptic tables for the recognition of the genera of the world.

Another thing, and a very important one, which has greatly influenced me, in making so many families, is, that not only do the imagoes themselves seem to possess good morphological characters that justify this separation, but that these are, in many instances, seemingly correlated by excellent morphological characters possessed by the larvæ, which would seem to indicate many natural groups.

My present views, respecting the arrangement of the series and families recognized, are incorporated in the following tables :

II. SUB-ORDER PHYTOPHAGA.—Abdomen broadly sessile; larvæ with legs.

Anterior tibiæ with one apical spur. Series I.—Xylophaga.

Anterior tibiæ with two apical spurs. Series II.—Phyllophaga.

Series I.—XYLOPHAGA.

This series represents four distinct families, which ~~may be separated~~ by the following characters :

Metathorax fissured in the middle at apex. 2.

Metathorax not fissured.

Vertex tuberculate ; antennæ inserted below the clypeus and eyes ; front wings with two submarginal cells ; abdomen cylindrical or depressed ; ovipositor not exerted. Family I., Oryssidæ.

2. Middle lobe of mesonotum attaining the scutellum and separated from it by a transverse line ; abdomen cylindrical or depressed.

Prothorax large, subquadrate ; costal cell of front wings not divided by a transverse nervure ; tip of abdomen ending in a triangular or lanceolate process. Family II., Siricidæ.

Prothorax conical ; costal cell of front wings divided by a transverse nervure ; abdomen at tip normal... Family III., Xiphydriidæ.

Middle lobe of mesonotum not attaining the scutellum ; abdomen more or less compressed. Family IV., Cephidæ.

Series II.—PHYLLOPHAGA.

This series I have separated into eleven distinct families, distinguished as follows :

Prothorax emarginate behind ; middle lobe of mesonotum much longer than broad, not separated from the scutellum by a deep fovea ; costal vein usually strongly thickened or clavate towards apex ; costal cell without an intercostal vein. 2.

Prothorax subtruncate behind ; middle lobe of mesonotum not much longer than broad, and separated from the scutellum by a deep

fovea ; costal nervure towards apex neither thickened nor clavate, the cubitus originating from the basal nervure ; costal cell with an intercostal vein ; scape of antennæ long or rather long.

Head transverse, the temples not very broad ; third joint of antennæ very long, three or four times longer than the long scape ; ovipositor more or less exserted... Family V., Xyelidæ.

Head quadrate, the temples very broad, third joint of antennæ rarely much longer than the scape ; abdomen much depressed, the ovipositor hidden..... Family VI., Lydidæ.

2. Basal nervure in front wings usually uniting with the subcostal vein far from the origin of the cubitus ; basal plates of first abdominal segment usually closely united, rarely showing a slight median emargination at apex ; if deeply emarginate, the sides of the abdomen acutely margined, while the antennæ are clavate.....7.

Basal nervure in front wings usually uniting with the base of the cubitus or with the subcostal very near its base ; basal plates of first abdominal segment most frequently not united, medially slit or with a wedge-shaped or broadly triangular emargination, sides of abdomen rounded, never acutely margined.

Front wings with two marginal cells.....6.

Front wings with one marginal cell.....3.

3. Front wings without a lanceolate cell.....5.

Front wings with a lanceolate cell.

Antennæ 9- to 25-jointed.....4.

Antennæ 3-jointed.

Hind wings with an anal cell ; tibiæ usually with lateral spurs ; antennæ in ♀ with the third joint very long, subclavate or filiform, densely hairy, in ♂ most frequently forked..... Family VII., Hylotomidæ.

4. Hind wings with an anal cell ; ♀ antennæ usually serrate or subserrate, ♂ antennæ ramose or biramose.. Family VIII., Lophyridæ.

Hind wings without an anal cell ; ♀ antennæ most frequently subclavate or filiform, ♂ antennæ usually ramose or filiform..... Family IX., Perreyiidæ.

5. Hind wings without an anal cell ; antennæ 6- to 25-jointed, in ♀ clavate or subclavate, more rarely filiform, in ♂ ramose, or simple, filiform, multiarticulate..... Family X., Pterygophoridæ.

6. Body rather short, oviform, the abdomen not long; scape small, scarcely longer than thick, not or only a little larger than the pedicel (except in the *Blasticotominæ*, which has, however, only 4-jointed antennæ); antennæ 4- to 15-jointed; head, seen from above, not quadrate, the occiput more deeply concave, the temples not so broad, more rounded behind, while there is no distinct furrow or depression between the antennæ and eyes, or so slight as to be scarcely noticeable Family XI., *Selandriidæ*.

Body elongate, the abdomen usually long, narrow and subcylindrical; scape rather large, usually thrice as long as thick or about four times larger than the pedicel; antennæ 9-jointed; head, seen from above, quadrate, the temples very broad and with a furrow, channel or depression on each side of the antennæ, between them and the eyes, which extends upwards and posteriorly on the vertex. Family XIV., *Tenthredinidæ* (pars)
(= Subfamily *Strongylogasterinæ*).

7. Front wings with two marginal cells 8.

Front wings with one marginal cell; second submarginal cell receiving two recurrent nervures; lanceolate cell contracted near the middle and closed at base, or petiolate; antennæ 9-jointed Family XII., *Nematidæ*.

8. Abdomen acutely margined at sides; antennæ clavate, 5- to 8-jointed . . 9.

Abdomen not margined at sides; antennæ not clavate, 8- to 9-jointed; front wings with three or four marginal cells.

Front wings with four submarginal cells, the second usually receiving both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus, very rarely joining the base of the third submarginal cell; abdomen short, oviform Family XIII., *Dineuridæ*.

Front wings with four submarginal cells, the second and third each receiving a recurrent nervure; if with three submarginal cells, either the first or the second transverse cubitus is wanting; abdomen elongate, subcylindrical. . Family XIV., *Tenthredinidæ*.

9. Dorsal plates of first abdominal segment usually deeply emarginate medially, leaving a membrane exposed. . . Family XV., *Cimbicidæ*.

NEW BEES FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Podalirius phenax, n. sp.—♂. Length about 9 mm.; appearance of *P. maculifrons* (Cress.), with the same white pubescence (mixed with black on hind part of mesothorax and front part of scutellum), the same clear wings (but the second submarginal cell is less narrowed above); and the same legs, except that the tarsi are wholly dark. The black antennæ are considerably longer, when the head is thrown back they reach to postscutellum; scape with a broad white stripe; first joint of flagellum a little shorter than third. Eyes a beautiful dark lavender or gray-blue, instead of green. Clypeus (except the narrow black anterior edge) a transverse supraclypeal band, lateral face-marks (triangular, with the upper side deeply excavated), labrum (except the usual pair of spots), and a large patch on mandibles, pure white, shining, like porcelain. Abdominal bands more or less interrupted in the middle; fifth segment without a band; apex with two spines.

Hab.—College Farm, Mesilla Park, N. M., April 13, 1898, at flowers of plum. Allied to *P. albatrus* and *P. maculifrons*.

Andrena subaustralis, n. sp.—♀. Length about 10 mm.; black, the abdomen with a hardly noticeable greenish lustre. Pubescence rather abundant, but not hiding the surface, dull white, on upper parts of head and thorax pale dull ochreous. Head broad, facial quadrangle broader than long; face hairy; clypeus strongly and closely punctured, with no median smooth line; frons strongly striated; antennæ black, brown at tips; mandibles rufescent at ends, with a strong inner tooth; process of labrum broad, truncate at end. Mesothorax minutely tessellate, with rather shallow and sparse punctures; enclosure of metathorax triangular, poorly defined, minutely granular, feebly wrinkled at the base. Legs dark, quite densely pubescent, the pubescence on tarsi more or less tinged with fulvous. Tegulæ black; wings yellowish-hyaline, apical margin broadly smoky, but not conspicuously darkened; nervures and stigma honey colour. Abdomen oval, convex, tessellate and very minutely punctured; first and second segments with some white hair at sides; third to fifth segments with very thin bands of long white hairs, that on the third very broadly interrupted; anal fimbria bright orange-fulvous.

♂.—Similar, but smaller and narrower; flagellum wholly dark;

pubescence of thoracic dorsum with quite a fulvous tint ; abdomen thinly pubescent, but hardly banded, hair at apex yellowish or nearly white.

Hab.—Paraje, N. M., April 11th, 1898, at flowers of plum ; 3 ♂, 1 ♀. Differs from *A. Belfragei* by the pubescence being not so bright, clypeus without impressed line, wings not very dark at apex, abdomen not so punctate. Also rather resembles *A. polemonii*, Rob.

Andrena prunifloris, n. sp.—♀. Slightly over 10 mm. long, black, with grayish-white to white pubescence ; *hind tibiae, and all the tarsi, bright ferruginous*. Head broad, facial quadrangle broader than long ; face hairy, but not so as to hide the surface ; clypeus minutely rugose and strongly punctured, with a small shining space in the median line not far from the anterior margin ; frons striate, with punctures between the ridges ; vertex minutely tessellate, and punctured ; antennæ dark, flagellum only faintly brown towards the end, first flagellar joint fully as long as the two following together ; process of labrum broad and low, feebly emarginate ; mandibles wholly dark. Thorax with rather abundant pubescence, not hiding the surface, grayish-white or very pale mouse colour on mesothorax, otherwise white ; mesothorax microscopically tessellate, with strong, rather close punctures ; metathorax dull, enclosure triangular, ill-defined, with irregular feeble raised lines. Tegulae piceous ; wings smoky subhyaline, nervures and stigma dark brown, third submarginal cell narrowed about one-half to marginal. Abdomen somewhat depressed, *shining, very distinctly punctured* ; hind margins of third and fourth segments with entire dense snow-white bands, second segment with a similar band broadly interrupted in middle, first with only patches of white pubescence at the sides ; *anal fimbria sooty*.

Hab.—Paraje, N. M., April 11, at flowers of plum. Allied to *A. viola*, Rob.

Hesperapis, n. g.—A small bee with the general aspect of a Philermine. Body rather densely clothed with very short mosslike pubescence ; longer hairs intermixed ; abdomen with entire hair-bands. Wings rather short ; stigma subobsolete ; marginal cell large, obtusely pointed, the apex not diverging from the costa ; two submarginal cells, the second about two-thirds the length of the first, narrowing rather more than one-half to marginal ; both recurrent nervures joining the second submarginal cell at about the end of the first and beginning of the last fifths. Hind legs with large black bristles. Ocelli large, very prominent,

in a broad triangle. Tongue short, pointed, daggerlike, its margin entire. Labial palpi 4-jointed, first joint long, but not excessively so, nearly as long as 3 and 4 together, these being about equal; 2 somewhat shorter than 1. *Maxillary palpi 6-jointed, first three joints moderately stout, the other three very slender; 2 conspicuously longest, all the others about equally long. No ventral scopa in ♀.

Hesperapis elegantula, n. sp.—♀. Length, $6\frac{1}{2}$ mm.; head and thorax black, abdomen dark ferruginous. Head oblong, facial quadrangle considerably longer than broad; face and cheeks with short snow-white pubescence, vertex with ochreous pubescence; clypeus with minute, rather sparse punctures; mandibles slender, reddish except at the extreme base, armed with a small tooth on the inner side; labrum clear ferruginous; antennæ short, especially the flagellum; scape and the rather large funicle black, flagellum brown; eyes dark, with a perceptible sage-green tint; pubescence of mesothorax and scutellum short and mosslike, with long hairs intermixed, ochraceous throughout, almost hiding the densely punctured surface; pubescence of postscutellum, metathorax and pleura white; basal triangle of metathorax minutely roughened, free from pubescence; tegulæ testaceous, pubescent; wings not reaching as far as tip of abdomen, hyaline, slightly milky or opalescent, stigma honey colour, nervures brown, subcostal nervure black; legs black, the knees and the hind tibiæ behind, reddish; pubescence of legs dull white; middle tarsi with a brown brush within; small joints of anterior tarsi with long dark lateral pencils of hair; outer side of hind tibia, and of basal joint of hind tarsus, with minute snow-white dense pubescence, and numerous long black bristles; abdomen somewhat depressed, of ordinary form, with five entire broad white hair-bands on the apices of the segments; the exposed ferruginous surface between the bands very minutely and closely punctured; fifth segment and apex with black bristles; pygidium shining, impunctate, with a small groove near its end; venter ferruginous, with no conspicuous pubescence.

Hab.—Mesilla Park, New Mexico, on campus of the Agricultural College, April 22, 1898, at flowers of *Dithyrea wislizenii* probably, possibly at *Senecio*. Collected by Mr. C. M. Barber.

This remarkable little bee seems to be most nearly allied to *Ammobates* (*Phileremus*), but it differs entirely in the mouth-parts, and might probably form a new tribe. From its structure and appearance it is probably parasitic in the nests of some other bee,

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXIX. THE CEdemeridæ AND CEPHALOIDÆ OF ONTARIO AND QUEBEC.

The family CEdemeridæ is of small extent, only five species, representing four genera, being recorded from the region under discussion. None of our species are very small and two of them at least often reach a size sufficient to render them readily noticeable. With the exception of *Nacerdes melanura*, which frequents houses, wharves, lumber piles and shipping, they are to be found on bushes and trees or else under boards in wooded districts.

Technically they may be defined as beetles having the hind tarsi four-jointed, the remainder five-jointed; the anterior coxal cavities open behind; the head not strongly and suddenly constricted at base; and the middle coxæ very prominent. The claws are either simple, dilated at base or with a basal tooth.

In appearance the genera differ considerably; however, those in our fauna belong to the three types of habitus of which figures are given, *Nacerdes* resembling *Asclera* in general form. It is hoped, therefore, that the collector may have no difficulty in identifying his Canadian captures. The generic table following is constructed on the lines laid down in the Classification and in Dr. Horn's recently published memoir:

- A. Eyes deeply emarginate, embracing the base of the antennæ, which are nearly as long as the body. Appearance much like a slender *Elaphidion* *Calopus*.
- AA. Eyes entire or nearly so.
 - b. Form robust, colour black with faint violet tinge. Tarsi with several joints spongy-pubescent beneath. *Ditylus*.
 - bb. Form slender, colour in part reddish or yellow.
 - c. Anterior tibiæ with one spur. Colour above yellowish, elytra tipped with black. Antennæ of male twelve-jointed *Nacerdes*.
 - cc. Anterior tibiæ with two spurs, antennæ eleven-jointed in both sexes. Colour blackish, prothorax wholly or in part reddish. *Asclera*.

Of course, it must be understood that the colour-characters given above are intended to apply only to the Canadian species.

CALOPUS, Fab.



FIG. 13.

C. angustus, Lec., would probably be taken by most beginners for a Longhorn on account of its slender form and brownish colour, which cause it to resemble, in general, certain species of *Elaphidion*. The antennæ are almost as long as the entire body. Surface of body brownish, pubescence scant, whitish. Head, including the eyes, about as broad as the prothorax, which is broadest at about one-third from apex, the sides arcuate in front, nearly parallel posteriorly; the thoracic disk is uneven with a broad ill-defined median impression, punctuation distinct. Elytra at base much broader than the prothorax, nearly parallel, slightly broader behind, each with three ill-defined costæ. Length, .50-.72 inch. Occurs also in the western United States, particularly in mountainous regions. Such specimens as I have met with were found under stones or boards. The form of this insect is shown in fig. 13.

DITYLUS, Fisch.

D. cæruleus, Rand., is stout, black with a violaceous tint most evident on the prothorax. Head punctured and rugose, prothorax finely and rather closely irregularly punctured, broadest in front of middle, sides oblique, hardly sinuate to base, which has a raised margin or collar. Median line distinct but not well defined. Elytra finely granulate or shagreened* with short, scarcely visible pubescence; each with four well-defined and nearly equidistant costæ. These costæ are but slightly elevated, their distinctness being due to the striæ bounding them on each side. Length, .48-.75 inch. (Fig. 14.)



FIG. 14.

Two other species are found in the Western or Pacific provinces: *D. gracilis*, Lec., which has a longer thorax (distinctly longer than wide), with less dense punctuation and not noticeably clothed with pubescence, and *D. quadricollis*, Lec., with a subquadrate thorax which is densely punctured, pubescent and opaque. In size these do not differ greatly from *D. cæruleus*, and so far as I have observed them their habits are the same.

NACERDES, Schmidt.

N. melanura, Linn., is an introduced form abundant in the Atlantic

*Dr. Horn has erroneously described them as "densely punctate."

cities and occasionally swarming on shipboard. It is readily recognized by the slender form, hardly broader behind, colour above yellowish, the elytra with blackish tips. Beneath it is blackish, the legs in part yellow. It reaches a length of about half an inch.

ASCLERA, Schmidt.

The two species of this genus are blackish insects of slender form, though not so elongate as *Calopus*, the prothorax more or less red, the elytra distinctly costate. They separate thus :



FIG. 15

Prothorax red, with three foveæ (one near middle of base, the others anterior to this and placed one on each side of the median line). Elytral costæ sharply elevated. .20-.26 inch. *ruficollis*, Say.

Prothorax with a large central blackish spot, the disk depressed more deeply on each side of the middle line. Elytral costæ distinct but less sharp than in the preceding species. .26-.32 inch. (Fig. 15). *puncticollis*, Say.

Allied to the CEdemeridæ is the small family Cephaloidæ represented in North America by the genus *Cephaloon*, which resembles in form a Longhorn of the Lepturoid series. The characters separating the two families are to be readily perceived in the form of head and claws. In *Cephaloon* the head is constricted behind and the claws are pectinate, besides bearing a long appendage. While only one species (*C. lepturides*, Newm.) has been actually reported from the eastern provinces, we copy Dr. Leconte's table of all the American species, since one (*C. tenuicorne*) has been taken on the Stickeen River in British Columbia, and the other may yet be met with in Canadian territory, since it is known from the White Mountains and Lake Superior. Dr. Leconte's table, amplified by the addition of some other characters, runs thus :

A. Appendages of claws broad, rounded at tip.

b. Outer joints of antennæ gradually broader, not elongated. Colour extremely variable and inconstant, may be entirely testaceous ; the usual colour is piceous, legs (in part), head (with or without a frontal dark spot of varying size), and prothorax (often with a discal spot and more or less of the sides dark), testaceous. .36-.48 inch. . . . *lepturides*, Newm.

bb. Four outer antennal joints slightly broader, the joints longer, especially the intermediate ones. Colour variable, testaceous,

head behind the antennæ, sides of elytra, under surface and sometimes also the legs (in part), and a median thoracic spot, piceous. .44-.48 inch *tenuicorne*, Lec.

- AA. Appendages of claws curved, acute, slender. Very elongate, testaceous or piceous, antennæ slender, filiform, scarcely thickened externally, joints 9-11 longer. .44-.50 inch *ungulare*, Lec.

The few papers treating of the above families in systematic form are:

1854. Leconte, J. L. Synopsis of the *Ædemeridæ* of the United States. Proc. Acad. Nat. Sci., Phila., VII.
 1866. Leconte, J. L. New species of Coleoptera. Smithsonian Misc. Coll. [Table of *Copidita*, p. 164; of *Oxaxis*, p. 165.]
 1874. Leconte, J. L., and Austin, E. P. Catalogue of the Coleoptera of Mt. Washington, N. H., with descriptions of new species. Proc. Bost. Soc. Nat. Hist., XVI. [Table of *Cephaloon* on p. 276.]
 1896. Horn, Geo. H. The *Ædemeridæ* of North America. Proc. Cal. Acad. Sci., 2nd Ser., VI.

NOTES ON PHILANTHUS.

BY S. N. DUNNING, HARTFORD, CONN.

I have been so fortunate as to have, while making the following notes, the collection of *Philanthus* belonging to the Academy of Natural Sciences before me.

Philanthus Sanborni, Cress. (*Philanthus Trumani*, Dun. Ent. News, VIII., 70, ♂, not ♀.)

This species does not always have the W-shaped mark on face described by Cresson.

Philanthus punctatus, var. *Cockerelli*, Dun. Ent. News, VII., 69 (1896).

The characters given by Cockerell, Ent. News, IX., 26 (1898), separate this from typical *punctatus*.

Philanthus scelestus, Cr.

On *Geranium* (probably *Richardsoni*). Evergreen, Colo., July 17. Also Santa Fé, New Mex., in August. (Ckll., 4252.)

Philanthus sublimis, Cr.

Vancouver Island, July 10-18, by Mr. C. Livingston.

Philanthus cleomæ, n. sp.

♀.—Length, 10-11 mm. Black, partly shining, with pale yellow markings. Clypeus, mandibles (except tip), two spots on genæ near base of mandibles (sometimes connected with line behind eyes), sides of face

to emargination of eyes, large subquadrate extension between antennæ, line behind eyes, two spots on vertex (sometimes connected), collar (sometimes a line or mark at sides or below), two spots on fore part of scutellum, spatulæ, postscutellum, two narrow lines and two large patches on metathorax (sometimes connected), tegulæ, tubercles, two small and one large spot behind and below (sometimes running underneath the thorax and connecting), interrupted band on first segment, usually emarginate, but sometimes interrupted band on second, emarginate bands on 3-5, all but apex of sixth, and almost all of legs (including coxæ), yellow; tarsi with a pale rufous tendency; antennæ brownish; a very few hairs on head and venter; distance between eyes about their greatest length; first joint flagellum distinctly longer than second; vertex and mesothorax with sparse fair-sized punctures, scutellum and postscutellum hardly punctured, enclosure of metathorax finely wrinkled, metathorax roughened rather than punctured, abdomen with large close punctures, becoming smaller towards apex, sixth segment but faintly punctured, venter sparsely so; wings hyaline, slightly clouded in outer half, nervures light rust coloured; collar declivitous.

Six females, four belonging to the Academy of Natural Sciences, and two in my own collection.

Hab.—Montana; S. Bernardino Co., Cal.; Las Cruces, New Mex.; (Ckll., 4786, on *Bigelovia*) and Denver, Colo. (D. 1105c and D. 1271a, on *Cleome serrulata*.)

Philanthus henricus, Ckll. and Dun., n. sp.

♀.—Length, 14 mm. Black with yellow and rufous markings. Mandibles (except piceous tip), clypeus, sides of face to emargination of eyes, a short emarginate extension between antennæ, a narrow line behind each eye, collar, tegulæ, small spot on tubercles, a larger spot behind, postscutellum, scape (partly), interrupted band on first segment, a narrowly interrupted band on second, emarginate bands on third and fourth, all of fifth and the last (except rufous apex), venter (except fore part more rufous), a spot on trochanters and last four coxæ, rest of legs (except rufous femora and rufous inclined tarsi), yellow. Yellow on face paler; a faint irregular rufous mark centrally on second segment; third joint antennæ as long as fourth and fifth combined; eyes as distant as their length; a fairly thick and long ochraceous pubescence on head, more sparse on thorax and still more so on venter; vertex, mesothorax, scutellum, postscutellum, disk of metathorax, abdomen and femora

shining ; basal segment constricted as in *punctatus*. Punctures on vertex distinct, fair sized, scattered ; on mesothorax and scutellum rather finer, scattered ; of about the same size on metathorax, but closely crowded (fovea with fine transverse wrinkles not Λ shaped or coarse as in *flavifrons*) ; on abdominal seg. 1-2, large and pit-like as in *punctatus*, still large but sparse on seg. 3, on remaining seg. fine and so few as to be hardly apparent. Wings hyaline, a little dusky at centre and more so at apex ; nervures pale rust-coloured.

One female in collection ; T. D. A. Cockerell.

Hab.—New Mex. (N. F. Gila, July 16).

In marking like *flavifrons*, Cr., and in build like *punctatus*, Say.

Philanthus multimaculatus, Cameron (*Philanthus annæ*, Dunning. Ent. News, 1897, p. 68, ♂, not ♀). Four males and three females before me ; the former are about 8-10 mm. long, the latter 11-12 mm. Las Cruces, N. Mex., on *Salix*, May 2, 1 ♂ (Ckll.) ; Mesilla, N. M., June 24, on *Aster spinosus*, 1 ♀ (ident. Ckll.) ; Calif. (taken by Prof. Griffith, Los Angeles), 2 ♀ ; Colo. (Baker, No. 1591), 1 ♀ ; Denver, Colo., July 20, 2 ♂, on *Cleome serrulata* (D. 1105a, D. 1271b).

Philanthus serrulata, n. sp.

♀.—Length, 9 mm. Black with yellow markings. A few ochraceous hairs on head and venter ; distance between eyes on vertex equal to length of joints, 3-5 of antennæ ; 3d. jt. antennæ longer than 4-5 combined ; cavities at extremities of scutellum and postscutellum, like *multimaculatus*, Cam., and others ; wings fulvo-hyaline, not clouded, nervures and stigma pale rust-coloured ; punctures on vertex close and fine, on mesothorax fine but irregularly scattered (postscutellum and scutellum not punctured), on metathorax close and fine, including enclosure (which is not well defined), on seg. 1-2 not quite so fine, but close, sparse on seg. 3 and still more so on seg. 4-5, on venter like seg. 1-2 ; face to ocelli (except base of antennæ), spot on scape and joints 3-5 on one side, spots on vertex and behind eyes, collar, two spots or lines centrally on mesothorax and two smaller spots at sides in front of tegulæ, scutellum, postscutellum, tegulæ, tubercles, spot behind, broad bands on seg. 1-2, narrow irregular bands seg. 3-6, knees, tibia, yellow ; apical 4 joints of antennæ and most of tarsi rust-coloured or rufous ; collar declivitous.

From *multimaculatus* it differs at once in fine punctures, clear wings and markings ; from *arizona* in distance of eyes apart on vertex, cavities

at sides of scutellum and postscutellum, and in coarser and more irregular punctures of abdomen. One ♂ spcm., Denver, Colo., July 20, 1898, on *Cleome serrulata* (D. 1105b).

Philanthus arizonæ, n. sp.

♂.—Length, 7 mm. Jet black with pale yellow markings. A fairly thick growth of fine white pubescence on face and cheeks, more downlike on thorax, hardly apparent on abdomen; eyes close, about the distance apart on vertex of the length of joints 3-4 of antennæ; collar declivitous; wings clear, not clouded, nervures outwardly fuscous, stigma and towards base pale rust-coloured; no cavity at sides of scutellum and postscutellum; joints 3-5 of antennæ on one side, face to ocelli (except base of antennæ), two spots on vertex and two behind eyes, collar, two spots on fore mesothorax centrally, most of scutellum, postscutellum, tegulæ, tubercles, spot behind, knees, tibia, yellow; lower face, tegulæ and tubercles very pale, almost white; tarsi rust-coloured mostly; punctures on vertex fine, sparse, on mesothorax fine, closer (scutellum and postscutellum not punctured), metathorax (including poorly defined enclosure) fine, close, on abdomen fine and close, about evenly distributed, on venter scattered, fine.

One ♂ spcm. taken by Dr. Griffith, at Phoenix, Arizona, Nov., '97, and numbered D. 1331 in my collection.

"Collar declivitous," as used above, describes *P. punctatus*; not declivitous would describe *P. ventilabris*.

THE EPIPLEMIDÆ THE LOWEST BOMBYCIDS.

BY HARRISON G. DYAR, PH. D., WASHINGTON, D. C.

The Epiplemidæ are a family of moths fairly well represented in India. (See Hampson's Moths of India, III., 121.) Only one larva is known, that of *Epiplema latifasciata*, Moore, and unfortunately the figure is insufficient to show more than that the feet are normal (five abdominal pairs) and the setæ probably single. The family occurs also sparingly in America. Hulst lists three genera as a subfamily of Geometridæ, the Strophidiinæ (Trans. Am. Ent. Soc., XXIII., 309); but I would certainly prefer Hampson's treatment, both as to the name and rank of the group.

By good fortune some larvæ of one of our species were bred at the Department of Agriculture at Washington in 1882, and inflated larvæ prepared by Koebele. They have remained undescribed to the present time. The species is *Callidapteryx dryopterata*, Grt., which falls near

the Indian genus *Orudiza*, Walk. The larvæ are remarkable. They possess the five normal pairs of abdominal feet, with rather few crotchets on the inner three-fourths of the planta, double hooked, of two not very regular lengths. The setæ are distinct but short, with large tubercles, single except that vi. consists of two setæ, arising from separate tubercles on abdominal segment 3 and posteriorly, but from the same tubercle on segments 1 and 2. Tubercles iv. and v. are separate on the posterior segments, strictly in line, iv. not at all higher. On abdominal segments 1 to 3 they are united together. There is a distinct leg plate with scattered setæ. On the thorax i. a + i. b, ii. a + ii. b, iii. separate, iv. + v., vi. double. The prothoracic shield is broken up, the lateral piece the most distinct and bearing three setæ. The head has single setæ, fairly distinct. Those on the epicraneum are normal above; i., ii. and iii. forming a right angle; iv. below; v., vi. and vii. behind the eyes; vii. situated between the two lower ocelli; viii. above the level of the eyes, midway between them and the clypeus; ix. half way

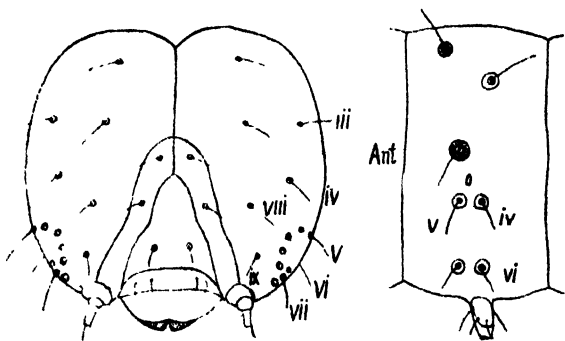


FIG. 16.

between viii. and the base of the antenna. (See Journ. N. Y. Ent. Soc., IV., 93, for numbering of head setæ.) I adjoin a figure showing the head and abdominal setæ of *Callidapteryx* in diagrammatic form. (Fig. 16.)

The interpretation of these structures is at first puzzling. There is a strange mixture of Bombycid and Tineid characters. Tubercle iv. is in its generalized position, yet on the forward segments it unites with v. as in the Tineids. But the fact that this union is not present throughout shows that it is a recent acquirement, for when such a character is congenital it is present on all the segments without equivocation. Another Tineid character is the union of the upper thoracic tubercles in pairs, especially of ii. b with ii. a. Again, on the head seta viii. is high up as in Tineids.

The Bombycid characters are the leg plates, the half row of crotchets on the feet, the doubling of tubercle vi, and breaking up of the cervical

shield. The usually decisive character of the position of tubercle iv. is here as indifferent as it could possibly be made. I explain the larva as follows: It is at the bottom of the Bombycids, and tubercle iv. has not yet taken up its definite position. The other Tineid anomalies are explained by a comparison with the Drepanidæ, with which this larva bears affinity in the setæ, although there is no hypertrophy of the anal plate. In *Drepana arcuata* the thoracic tubercles ii. a and ii. b are united, the epicranial seta viii. is high up, above the level of the eyes, and abdominal tubercle vi. is doubled, all as in *Callidapteryx*. *Drepana* is then also a low form, but here abdominal tubercle iv. is in the characteristic Bombycid position.

The Epiplemidæ, then, stand at the bottom of the Bombyces, throwing off on one side the Drepanidæ, on the other (judging from the moths) the Geometridæ. Near them the Notodontian stem has arisen, giving rise to the other Bombycid families. (See Proc. Boston Soc. Nat. Hist., XXVII., 146, for a genealogical tree. The Epiplemidæ may be added at the point where the stem of the Drepanidæ joins that of the Geometridæ.)

Callidapteryx dryopterata, Grote.

The larvæ were found abundantly at the end of July on *Viburnum nudum*. Moths emerged August 16th, and eggs and young larvæ were found immediately after. Pupæ by September 6th between leaves. Evidently two-brooded. No description accompanies these notes in the books of the Department of Agriculture, and I do not think an adequate one can be made from the blown larvæ. They may have been green or whitish with broken brown lines, tubercles i. and iii. large and dark, the rest pale. Head spotted, 1.4 mm. wide. There is no record of whether the larvæ were exposed or concealed feeders. Stage I. is preserved mounted on a slide labelled 3/4/92, No. 2826, but so badly shrunk that I cannot see the arrangement of setæ. Feet slender, the crotchets nearly bordering the planta, anal plate prominent but not produced; setæ large.

THE TORONTO BRANCH of the Entomological Society of Ontario held its second annual meeting on the 1st of April last. The following officers were elected for the ensuing year: President, Mr. R. J. Crew; Vice-President, Mr. C. T. Hills; Secretary-Treasurer, Mr. Arthur Gibson; Librarian-Curator, Mr. H. D. Chipman; Members of Council, Messrs. H. C. Tyers and E. M. Fenwick. The Department of Education for Ontario has granted to the Society the free use of a room in which to hold its meetings and place its library and collections.

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE
GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, N. Y.

(Continued from page 121.)

LEPTOMERIS NIGRODISCALIS, n. sp.

Expands 24 mm. Palpi and front black; vertex ochre-white; antennæ whitish below, blackish or smoky above; thorax and abdomen white, slightly ochre stained. Fore wings white, with four somewhat indistinct, broad, even, wavy, ochre lines, the first well out from base, the second just outside of discal spot, the third in outer space, the fourth marginal; hind wings with corresponding broad lines; discal points prominent, rather large, jet black; four fine marginal black points below apex on fore wings; beneath more diffuse, more fuscous, less ochreous, the lines less determinate; discal spots not so marked, black points as above on margin of fore wings, and some appearing below apex along margin on hind wings.

Maine.

EOIS PERSIMILIS, n. sp.

Expands 23-26 mm. An insect strongly resembling in superficial appearance *Eois 5-linearia*, Pack. It is smaller than that species, with the hind wings rounded, and not angled as in *5-linearia*. The lines of the wing are brownish ochreous, and straight or slightly bent, not at all wavy and angulate as in *5-linearia*. The ground colour is a clearer white, and has a sprinkling of brownish or blackish scales. The cross lines are rather broadish, even in width, and quite distinct. Beneath as above, with the lines the same, though not so definite as above. Discal spot obsolete above, quite distinct, black, below.

Canada, from Quebec and Ontario; sent by Mr. Hanham, of Winnipeg. The species seems to be midway in some respects between *E. inductata*, Guen., and *E. 5-linearia*, Pack. Mr. Hanham writes me *inductata* is taken at Winnipeg in abundance on the open prairies, while this species he has taken only in dark woods.

EOIS HANHAMI, n. sp.

Expands 23-26 mm. Palpi black, front black, vertex white; thorax and abdomen white or slightly smoky stained; fore wings, ground colour white or slightly fuscous stained, with a sprinkling of blackish points sometimes numerous enough to give a fuscous shading; lines three,

rather faint, blackish, rounded, parallel with each other, equally separated, finely and evenly dentate so far as evidenced; hind wings with three corresponding lines; beneath, more fuscous than above, the inner lines fainter or entirely obsolete; fore wings, apex and outer margin rounded, hind wings without angle.

Closely allied to *E. 5-linearia* and *persimilis*, but with much more rounded wings, and the outer lines different in direction.

Winnipeg, Manitoba; from Mr. Hanham.

SYNCHLORA LOUISA, n. sp.

Expands 18-22 mm. Palpi dull red; front whitish or red below, red above; summit pure white; thorax light green, deep purple-red stained above in ♂, green in ♀; abdomen of ♂ white, deeply stained with purple-red above, end white, with a large snow white spot dorsally on basal segment, and another posteriorly on third segment, (abdomen of ♀ wanting); antennæ pure white, in ♂ pink tinted. All wings clear bright light green, edged with purple-red along costa, and on outer margins, this running out on fringe at end of veins more or less deeply; the colour is more heavy in the ♂, and broadens somewhat on fore wings on outer margin below apex, and at posterior angle; fringes white, more or less purple stained in ♂; discal spots present on all wings, fine, reddish. Beneath smooth, even, silky white, with a greenish tinge; marginal lines fine, purple.

Cocoanut Grove, S. Florida. A very pretty insect. One type in National Museum, No. 3918.

SYNCHLORA VIRIDIPURPUREA, n. sp.

Expands 25-27 mm. Palpi reddish at end, end member very long; front reddish below, dark green above; summit pure white; antennæ white at base, becoming light ochre outwardly; thorax deep clear green; abdomen deep green, the posterior segments light green anteriorly, end reddish, with reddish spots dorsally on posterior segments. All wings deep green, even, somewhat striated with whitish; fore wings with apex sharp, subfalcate; discal point small, reddish-brown; marginal line purplish; an indication of an outer line is given in red spots on the veins towards costa, which become a large purple blotch filling the wing at inner angle, extending one-third towards base, and nearly half way to costa. The hind wings have a diffuse purplish discal spot, purplish marginal line, and a large rounded purple blotch along anal margin and within anal angle; beneath, whitish-green, the purplish blotches faintly showing; body white below, with some reddish on abdomen.

Charlotte Harbor, Indian River and Lake Worth, Florida ; of the size and form of *S. hollandaria*, Hulst, especially distinct, however, in lacking the white spots on wings. I have seen ♀ ♀ only, and the genus may not be properly determined.

SYNCHLORA TEXANA, n. sp.

Expands 25 mm. Palpi and front reddish ; antennæ light ochre ; thorax clear green ; abdomen light green, with pure white spots, rather large, on each segment dorsally. Fore wings, costa rounded, apex pointed, posterior angle distinct, the wings clear green, quite evenly striated with white ; inner line scarcely evident, outer line not very distinct, strongly wavy, about parallel with outer margin, discal spots prominent, distinct, reddish-brown ; marginal line clear distinct reddish-brown also, fringes white, reddish-brown at end of veins. Hind wings of same colour as fore wings, posterior angle prominent, outer margin somewhat wavy ; discal spot distinct, reddish-brown ; marginal line distinct, reddish-brown, fringe white, red at end of veins. Beneath whitish-green, even ; discal points and marginal line reddish-brown, not so sharp as above ; costa of fore wings above and below, as also fore tibiæ on inner side, tinged with reddish.

Austin, Texas. I have the male only.

APIODES CATACHLOA, n. sp.

Expands 24 mm. Palpi and front reddish ; palpi of ♂ short and stout ; antennæ light ochre, pure white on top of stem ; summit pure white ; collar red ; wings bright green, somewhat washed with white, and intermixed with white scales, broad, rounded, a small red spot costally at base, the rest of costa narrowly white ; two not very distinct cross lines continued across both wings, the inner less wavy, the outer more distinct, two-thirds out, parallel with outer margin and wavy ; discal spots distinct, blackish-brown ; margins red ; fringes white. Beneath light whitish-green, the fore wings anteriorly slightly greener than the rest ; fore wings with costa rather broadly ochre nearly to apex ; discal spots distinct, blackish ; margin faintly reddish ; thorax dark green above ; abdomen above green at base, becoming white at end, with a greenish tint dorsally ; on third, fourth, fifth and sixth segments dorsally, red enclosing pure white subtriangular spot ; beneath pure white, except that femora and tibiæ of fore legs are red in front.

Charlotte Harbor, Florida. Mrs. Slosson.

APLODES OBLIQUA, n. sp.

Expands 26 mm. Palpi and front ochre, stained with reddish; summit white; antennæ ochre, white above; collar green; thorax, front and tegulæ deep green, dorsally and posteriorly dull ochre; abdomen ochre-white, with reddish on segments above; fore wings deep even green, whitish-ochre along costa, with two broad white lines; the inner, one-third out from base and reaching inner margin an equal distance from base; the outer line two-thirds out, parallel with outer margin, thus very closely approaching basal line at inner margin, while widely separated at costa; a red marginal line, fringe pinkish, discal spots wanting; hind wings deep green, lighter at base; lines broad, white, the basal not distinct, the outer only slightly rounded; marginal line red, fringe pinkish. Beneath as above, but lighter green, and lines less distinct.

Colorado; from Mr. Bruce.

DEILINIA PULVERARIA, n. sp.

Expands 35–38 mm. Palpi black; front dark brown; thorax dark brown, mixed with blackish; abdomen dark fuscous; fore wings dark fuscous, overlaid with black scales, with many of violet-brown, giving a general dark, almost blackish-brown colour; this darkest at base as shading of basal line, as a broad band over central portion and on outer and submarginal portions; between middle and outer lines is a band of reddish-brown, and on submarginal field a line of whitish lunules or scallops; a marginal line of black dashes present; discal spot a whitish annulus; hind wings fuscous in dark cross striations, heaviest and so darkest outwardly; discal spots distinct, black. Beneath fore wings fuscous, with cross striations, cell more darkened, with an outward black band, distinct towards apex, obsolete before inner margin; hind wings fuscous, with coarser blackish striations darkening the outer portion of the wing, the wing outwardly having a brownish tint.

Rossland, British Columbia; from Mr. Danby. Taken by him from April 18th to May 9th. The general appearance of the insect is much like *D. litaria*, Hulst.

DEILINIA BEHRENSARIA, var. *CERVINICOLOR*, n. var.

I wish to give this varietal name to the marked cervinous form of *D. behrensaria*, Hulst. The type form is reddish-ochre or ochre, while the variety is very distinct in appearance, being of the colour stated above, this replacing the colour of the type on all wings.

MACARIA PICTIPENNATA, n. sp.

Expands 23–27 mm. Palpi fuscous gray; thorax and front light, clear gray; abdomen gray, fuscous stained; fore wings clear gray, overlaid with blackish in fine dots and striations; inner line faint across the wing, with a black spot at costa, nearly straight; median shade faint, also black at costa; outer line white, only slightly sinuous, edged on both sides with blackish, this becoming heavy black spots at costa and vein 4; a submarginal shade and black or broken black margin; hind wing fuscous gray, darker outwardly, striated, without lines; discal spots evident on all wings, but not strong; beneath light gray with fuscous tinge, and an ochre shading, nearly white on inner half of hind wings, the outer third on all wings darker.

Prescott and Senator, Ariz.; from Dr. Kunzé. Taken July 1st, and Sept. 1st to Sept. 9th, 1896. The insect is bright in appearance, resembling *Sciagraphia muscariata*, Guen., but brighter, and with outer line not angled near costa, differing as well as in the antennal structure of the male.

NACOPHORA QUERNARIA, var. *ATRESCENS*, n. var.

I have received this very marked form from Mr. Moffat, of London, Ontario. The general colour is black with a narrow whitish basal line, and a narrow whitish outer line, which broadens near inner margin. The hind wings have an outer broad whitish band; each of these is the edging of the normal black lines of *quernaria*, these lines being evident in the variety. Beneath as above, the colours a little sharper and less squamose.

London, Ontario, Canada; from Mr. Moffat.

SCIAGRAPHIA SPODOPTERATA, n. sp.

Expands 35–38 mm. Palpi, front, thorax and abdomen light fuscous to nearly white, the abdomen being darkest and sometimes interlined with black. Fore wings fuscous-white to white, the surface more or less marked with points and cross striations of fuscous; lines three, subparallel, black, equally distant, the basal and outer heavy, distinct; the middle, which is through the discal point, lighter and more variable; these lines are straight or slightly sinuous, continuing to the costa without the angle or sharp bend so generally found near costa in species nearly allied, in this respect resembling *trifasciata*, Pack. Outer margin somewhat lighter; marginal line black. Hind wings gray-fuscous stained, or with considerable fuscous striations, with a basal and extra discal black line—these

varying in intensity—the basal often, and both sometimes, obsolete. Beneath more diffusely obsolete, the lines above showing in depth of colour, but not black nor distinct.

Colo., Cala. The specimens are all females. The species is nearest to *atrofasciata*, Pack., but is much larger in size and lighter in colour.

SCIAGRAPHIA FLAVIVENATA, n. sp.

Expands 34 mm. Palpi ochreous at end and above, brownish below; front fuscous ochreous; antennæ ochreous, blackish above; thorax brownish, with a dorsal gray line, and ends of patagiæ bright orange-ochreous; abdomen with white dorsal lunule at base, the rest yellow with scattered dark scales. Fore wings blackish, ochreous, with distinct cross striations of yellow and whitish, the yellow striations more prevalent along the costa, the white on the rest of the wings, these being enough to give a banded appearance at base, intradiscally, and outwardly, the latter being more clear and somewhat uneven; veins clear deep yellow. Hind wings dirty grayish, somewhat mottled, the markings being more distinct in colour along inner margin, and at dorsal angle. Beneath dull fuscous mottled gray, a whitish line from apex to inner margin on fore wings, and a blackish extra-discal line on hind wings; all discal spots distinct.

Taken near Quebec, Canada, and sent to me by Mr. Hanham. A very beautiful insect with peculiar markings. Since writing the description I have seen another specimen from New Hampshire.

DIASTICTIS PARTICOLOR, n. sp.

Expands 28 mm. Palpi stout, ascending, rather long, end member very short, these with front dark purple, mixed with whitish; summit violet; collar purple-yellow; antennæ filiform, purplish; thorax yellow; abdomen yellow at base, becoming purplish and whitish at end, with the purple pronounced dorsally; wings yellow, somewhat stained and striated with purple or violet, the fore wings less so and brightest yellow anteriorly; cross lines scarcely suggested; discal spots prominent, pure white, surrounded with a purple clouding; outer field violet, edged within with dark purple, beginning at vein 7, running narrowly and evenly to between veins 5 and 6, then at a right angle, becoming much broader, reaching half way to cell; the inner margin then curving around to inner angle; hind wings, corresponding violet spot reaching along outer margin, limited within by a dark purple, rather broad edging, nearly straight from anterior to posterior angle; all fringes purplish. Beneath lighter, ochre

to ochre-yellow, the spots showing through in a purple shading ; discal spots as above, indistinct. Legs white, fore legs and tibiæ of middle legs purplish in front.

Lake Worth, Fla.; Mrs. Slosson. A very pretty insect.

DIASTICTIS MARICOPA, n. sp.

Expands 26 mm. Palpi and front dull clay colour ; thorax dull whitish ; abdomen dull whitish, with intermixed darker scales ; fore wings dull clay colour, with three black cross lines, each much more heavily marked at costa ; the basal is rounded somewhat wavy ; the other two fine, rounded, and broken, the outer being emphasized into a distinct and prominent black spot at vein 4 ; a marginal line of black points ; hind wings rather more grayish, with black atoms, these suggesting two cross lines near the middle. Beneath nearly as above in colour, the lines faintly showing on all wings.

Arizona.

DIASTICTIS FLORIDENSIS, n. sp.

Expands 22 mm. Palpi fuscous orange-ochre, front orange-ochre ; thorax fuscous ochre, with blackish scales intermixed, the end of the abdomen becoming more orange-ochre ; fore wings fuscous, with an ochre tinge, squamose with fuscous points, a faint rounded outer line of darker fuscous, and a faint small spot in outer space on vein 4 ; hind wings bright orange-ochre, ochre along inner margin, with scattered fuscous striations, showing into a faint median line and an outer line of fuscous spots ; discal spots on all wings blackish ; beneath, all wings bright orange-ochre, the lines and spots showing as above and somewhat more clearly.

South Florida, from Mr. Rautenberg. I have the ♀ only, and the generic reference is provisional and doubtful.

DIASTICTIS OLIVALIS n. sp.

Expands 25 mm. Palpi heavy, drooping, fuscous ochre ; front fuscous ochre ; thorax olivaceous fuscous ochre ; abdomen fuscous ochre. Fore wings smooth, even olivaceous fuscous, dark fuscous narrowly along costa and forming outwardly a marginal line ; discal spots and lines obsolete and unsuggested. Hind wings light fuscous, with fuscous striations, making them approach the colour of the fore wings, but with scarcely an olivaceous tinge. Beneath fuscous with a violet tinge, costa and veins slightly ochreous ; hind wings squamose ochre fuscous.

Without locality, in U. S. National Collection, type No. 3957.

[TO BE CONTINUED.]

OBITUARY.

DR. JOSEPH ALBERT LINTNER.

By the death of Dr. J. A. Lintner, which occurred at Florence, Italy, on May 6th, economic entomology has lost one of its oldest, ablest, and most distinguished devotees. He was of German parentage, and was born at Schoharie, N. Y., February 8th, 1822. He graduated from the Schoharie academy at the age of fifteen, and for the next thirty years was actively engaged in mercantile pursuits in New York City, Schoharie, and Utica. The study of natural history became a fascination for him early in life, and in 1853 he turned his attention especially to insects, and rendered valuable aid to Dr. Fitch, who was then making an entomological survey of the State of New York.

Dr. Lintner's first paper upon insects was published in 1862, and six years later he became zoological assistant in the New York State Museum of Natural History. He continued in the service of the State until his death, working as assistant in the Museum for twelve years, and in 1880 receiving the appointment of State Entomologist. This thirty years of continuous active service in an official capacity, in a useful and limited scientific field, and in a single State, is certainly a remarkable record, and one which speaks volumes of praise for Dr. Lintner.

He richly deserved the honour of the degree of Ph. D. conferred upon him in 1884 by the University of the State of New York. He was also honoured with the presidency of several scientific associations, and his name is enrolled among the members of many entomological and other scientific societies, both in America and in Europe. The publications of Dr. Lintner merit the highest praise, and deservedly entitle him to the foremost rank among the economic entomologists of the world. He published more than a thousand miscellaneous articles upon injurious insects, besides his four important "Entomological Contributions" and his twelve reports as State Entomologist; probably the thirteenth report, for 1897, is in the printer's hands.

These reports are justly entitled to the highest rank among the scientific publications of the great Empire State. They represent the highest ideal or model of what such reports should be, both from a scientific and a practical standpoint. For typographical neatness and scientific accuracy, for the simple, yet elegant and dignified, way in which dry scientific facts are made interesting and adapted to the understanding

of the agriculturist, Dr. Lintner's reports have not been excelled in the world's entomological literature. Such indexes as his reports contain are rare in any literature. One is still more impressed with the scientific and literary attainments of Dr. Lintner, when one understands that, practically, he never had any of the modern facilities, such as are found at many of our experiment station, for studying the habits of insects; his office was his literary sanctum, laboratory, museum, library and insectary combined.

Dr. Lintner was a man of quiet and dignified manners, always courteous and pleasant to meet in social intercourse. He was ever ready to impart from his vast fund of knowledge; and, being an impressive speaker, he always commanded the attention of scientific bodies which he was called upon to address. His frequent addresses before horticultural and agricultural societies in his own and in other States, and farmers' meetings of all kinds, were always full of information. He had recently been granted a well-earned six months' leave of absence, and was spending it in sunny Italy when the death summons came. In Dr. Lintner the agriculturists of New York found one of their best and most helpful friends, and entomologists the world over a true and sympathetic co-worker. His name well deserves a place in that list of names enshrined in the hearts of every American economic entomologist—Harris, Fitch, Walsh, LeBaron, Riley—and Lintner. M. V. SLINGERLAND.

PROFESSOR DAVID SIMONS KELLICOTT.

Professor David Simons Kellicott was born at Hastings Centre, Oswego County, N. Y., January 28, 1842, and died at his home in Columbus, Ohio, April 13, 1898. In his boyhood his frail constitution and delicate health required him to spend much of his time out of doors, and it is to this, no doubt, that, in part at least, his love for nature may be traced. He graduated from Syracuse University with the degree of B. Sc., while the institution was yet known as Genesee College; teaching one year in Southern Ohio, prior to his graduation. After graduating, he taught one year in Kingston Normal School, Pennsylvania, after which he was connected for seventeen years with the State University at Buffalo, N. Y., being Dean of the College of Pharmacy and also Professor of Botany and Microscopy. He came to the Ohio State University in 1888, where for ten years he has occupied the chair of Zoology and Entomology. At the time of his death he was General Secretary of the American Association for the Advancement of Science, President of the American Microscopical Society, and Treasurer of the Ohio Academy of

Science. He had served as President of the Buffalo, N. Y., Academy of Science and the Ohio Academy of Science.

Animal Parasites of Fishes, and the Rotifera, from time to time claimed a considerable portion of Professor Kellicott's attention, but his entomological work won for him the admiration of the entomologists of America. Patient, conscientious and utterly devoid of selfishness, he was one of the most kind and lovable men the writer has ever met. Faithful and just with his colleagues and the idol of his pupils, seeking patiently and industriously after the truth, he won esteem while living, and in his death he has left numberless friends to mourn his loss. If there was ever a man who deserved the reward, "Well done, thou good and faithful servant," that man was David S. Kellicott; and the fruits of his labours will stand as an enduring monument to his faithfulness among his fellow-men. He began to contribute to the CANADIAN ENTOMOLOGIST in 1878, his last article appearing in 1896. F. M. WEBSTER.

BOOK NOTICES.

A TEXT-BOOK OF ENTOMOLOGY, INCLUDING THE ANATOMY, PHYSIOLOGY, EMBRYOLOGY, AND METAMORPHOSES OF INSECTS, FOR USE IN AGRICULTURAL AND TECHNICAL SCHOOLS AND COLLEGES, AS WELL AS BY THE WORKING ENTOMOLOGIST.—By Alpheus S. Packard, M. D., Ph. D. New York: The Macmillan Company, 66 Fifth Avenue; 1898. Price, \$4.50.

The book is primarily divided into three parts: Part I. being devoted to Morphology and Physiology, Part II. to Embryology, and Part III. to Metamorphoses. Under these divisions Dr. Packard treats his subject as follows: Position of Insects in the animal kingdom; Relation of Insects to other Arthropoda; Insecta (Hexapoda); The Head and its Appendages; The Thorax and its Appendages; The Abdomen and its Appendages; The Armature of Insects; The Colours of Insects; Muscular System; Nervous System; Sensory Organs; Digestive Canal and its Appendages; Glandular and Excretory Appendages of the Digestive Canal; Defensive or Repugnatorial Scent-Glands; Alluring or Scent-Glands; Organs of Circulation; Blood Tissue; Respiratory System; Organs of Reproduction; Development of the Egg, Larva, Pupa, and Imago; Hypermetamorphism; Summary of the Facts and Suggestions as to the Causes of Metamorphism.

The volume contains 729 pages, including a carefully prepared index, 654 figures and numerous valuable bibliographical lists. We certainly have nothing in the way of entomological literature in this country that will cover the field of development of insects as will this last work of Dr. Packard. Not only the teacher and student, but the educated men and women of the world at large who may desire to know more of the anatomy, physiology and metamorphoses of insects, will find in this work the very aid that is most desired. With this work and some other like Comstock's Manual, any student of ordinary ability can begin at the very foundation of entomology and work his way upward fully as easily as has heretofore been possible in zoology. The advent of this work certainly marks the trend of entomological studies in America. In future, except in some particular groups, we are to have less species-making and more studies of the development and transformations of those already well known in the adult stage, as well as of their inter-relations with each other and with other organisms about them. We shall not study dried corpses alone, but life in connection therewith, and the possession of pinned specimens of the adults in our cabinets will only increase our desire to know more of the problems of their existence.

F. M. W.

ARANEÆ HUNGARIÆ—By C. Chyzer and L. Kulczynski.

The last part of Vol. II. of this important work has just been published (Jan., 1898), and completes the account of the Hungarian spiders. This part is of two hundred pages, and five plates, and contains the families Zodarioidæ, Agalenoidæ, Drassoidæ, Zoropseoidæ, Dysderoidæ, Filistatoidæ, Calommatoidæ, Theraphosoidæ, and an appendix with additions to previous parts of the work. Nearly 800 species are treated; and in this part forty spiders are described as new, thus showing how much there is yet to be done in a well-known part of Europe. In a systematic way the authors have closely followed Thorell. Tables are given for the separation of genera and species, which are useful to the American student in indicating lines of systematic work in this country. For clear definition of species the work is, I believe, the best that has ever been written.

N. B.

The twenty-eighth annual report of the Entomological Society of Ontario for 1897 has recently been issued by the Department of Agriculture. It consists of 104 pages, and is illustrated by 56 wood cuts and 2 plates. One of the latter gives an inside view of the Society's library and cabinets, with the well-known figure of Mr. J. Alston Moffat, the librarian and curator. The picture is reproduced from a photograph kindly taken by Mr. R. W. Rennie, of London.

Mailed June 2nd, 1898.

The Canadian Entomologist.

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No. 7.

THE IMPORTATION OF THE SAN JOSE SCALE, ASPIDIOTUS PERNICIOSUS, FROM JAPAN.

BY F. M. WEBSTER, WOOSTER, OHIO.

In *Entomological News*, Vol. IX., pp. 95-96, Mr. T. D. A. Cockerell states that Mr. Alexander Craw, quarantine officer at San Francisco, California, had "two or three times" found *Aspidiotus perniciosus* on trees from Japan, and, notably, on a plum tree that arrived January 25th, 1898.

On April 29th, 1898, the writer found *A. perniciosus* with *Diaspis amygdali* on Japan white semi-double Flowering Cherry, received direct from Japan during the winter of 1896-97, the trees having been planted out in an isolated locality during the latter part of April, 1897, and though having been growing in America for nearly or quite a year, their location was sufficient proof that they could not, by any possible chance, have become infested in this country. Only a part of the trees were infested, and these but slightly, the scale being more abundant near the surface of the ground and diminishing in numbers upward, while there were none to be found on the branches. The trees were small, being only about a half inch in diameter at base.

A lot of stock, belonging to the same varieties as those above mentioned, *Prunus pandula* and *P. pseudo-ceraceus*, that had also been imported directly from Japan and from the same firm, but during the winter of 1897-8, was then examined. Unlike the first lot, these trees had never been removed from the storehouse where they had been removed from the boxes in which they were imported. These trees were smaller than the others, having evidently been arch grafted, on older stock of some variety of cherry, by cutting off the original top and leaving a stump about six or eight inches in height and an inch or more in diameter, the cleft for the insertion of the graft being made after the usual manner, but instead of using a scion in the ordinary way, a young growing shoot of the flowering cherry had been inserted into the cleft at one side of the stump at the top, and the juncture covered with grafting

wax, the shoot, however, not being severed until after it had united with the stump, when it was cut off just below the juncture, thus greatly facilitating the growth of the graft, as it could draw its nourishment from the parent stock until it had firmly united with the new. These old stocks or stumps were much more seriously infested with the San José scale than the younger wood, averaging from one to six individuals to the square inch of bark surface, but extending upwards on the young growth well toward the extremity. On the old wood many of the scales were dead, but there were plenty of live ones and it was impossible to determine whether or not the dead had been parasitized, partly eaten by carnivorous enemies, or crushed in the handling of the stock, but that this was a direct importation does not admit of a doubt.

Mr. Cockerell thinks that the San José scale may probably be a native of the more or less elevated regions of Japan, the species of scale insects found there near the sea level seeming to belong to oriental tropical types. It was impossible to learn the exact locality where the stock examined by me had been propagated, but there were certainly no indications of immunity to the attack of this scale, though the trees might, perhaps, have withstood the attack better and survived longer, but, judging from all that could be observed from the actions of the scale on the importation of 1896-7, without the influences of natural enemies, it would spread as rapidly on a tree from Japan as it would on one from America, and this raises the question as to why, if it occurs in Japan, as it certainly does, this scale does not become as destructive there as with us in America. If this immunity is not due to resistive powers of the stock, and I certainly believe, from what I saw in these cases, it is not, then the protection must come from the influences of natural enemies, which is of itself the best possible proof that Japan is the native home of *Aspidiotus perniciosus*, and that we have a case parallel with that of the introduction of the Cottony-cushion scale, *Icerya purchasi*, into California from Australia. We have imported the San José scale and left behind its natural enemies that hold it in check in Japan, and while we cannot tell just what these enemies are, if the scale is a native of that country we have probably been importing it for years, and in that case, if the enemies were of a fungous nature, or internal feeders, we should have gotten them with their host insect long ago. It seems probable, then, that these enemies, or at least the one that is holding this scale in check, is one that is easily separated from its food and has for this reason been left

behind in the importation of fruit and ornamental stock upon which the scale has occurred. The overwhelming success that followed the introduction of the Australian lady beetle, *Novius cardinalis*, and the suppression of the Cottony-cushion scale might not again be repeated in the case of the San José scale, as, in case of a successful introduction of its natural enemies, its wide diffusion over the country would render its suppression much more difficult, but it would now seem that we have in our possession information enough to indicate very strongly that in Japan *Aspidiotus perniciosus* has natural enemies, which, if brought to this country and distributed in infested orchards and places where the scale exists, would sooner or later overcome this pest and hold it in check thereafter. We have accomplished this once and saved from ruin an immense industry, starting with even less prospects of success than we now have in the case of the San José scale. A competent entomologist located in Japan, for perhaps a year, would solve the problem, as within that time he would be able to study the San José scale and its enemies over a considerable area of country, and if such enemies were transmittible, and we have no reason to suppose that they are not, arrangements could be made to have them transmitted in quantity to the various Experiment Stations in this country in the States where the scale is known to occur. From a scientific standpoint, there does not appear to be a single significant obstacle in the way of again carrying out this plan of introducing from a foreign country the natural enemies of an insect that has been introduced with the plants upon which it depredates, while these natural enemies, owing to their habits, have been left behind.

Financially speaking, there ought to be no question as to the value to the country of the benefits to be derived from this importation, in case it is found to be practical. Even if it should fail, which must be reckoned among the possibilities, but not by any means among the probabilities, the financial loss would be but a mere bagatelle for either Canada or the United States, or even a single State, for that matter.

The total expense of sending Mr. Koebele and myself to Australia (See reports U. S. Commissioners to Centennial Exhibition at Melbourne, 1888, p. 78) in 1888-89, exclusive of salaries, was exactly \$1,694.97. With \$2,000 or \$2,500 at his disposal, an entomologist would be able to accomplish all that I have indicated, provided, of course, that he was already a salaried officer and his pay was continued by the institution with which he was connected. There are two widely separated town-

ships in Ohio, in either one of which the San José scale has done injuries that would amount to the larger of these sums, if not even more, and the Province of Ontario is probably spending fully as much in trying to exterminate the scale in some of the localities where it has already obtained a foothold.

TWO NEW SPECIES OF KERMES FROM KANSAS.

BY E. E. BOGUE, STILLWATER, OKLAHOMA.

Kermes pubescens, Bogue, n. sp.

♀ scale spheroidal, $3\frac{1}{2}$ mm. in diameter, 3 high; pointed and grooved beneath; covered all over with short straggling whitish pubescence. Colour rather light brown, with more or less obscure and suffused dark brown bands marking the obsolete segments. Surface shining, with minute concolorous specks, but no dark spots or pits.

Hab.—On twigs and leaves of oak (*Quercus macrocarpa* and *Q. prinoides*), at Manhattan, Kansas. Collected by Mr. J. B. Norton. Mr. Norton reports that this does considerable damage to *Quercus macrocarpa*. It occurs very thickly on the young twigs and leaves.

"Allied to such species as *K. galliformis*, but very distinct by its pubescence, dark colour with suffused markings, and comparatively small size." (Ckll. in litt.)

The following species, also found by Mr. Norton, has been described by Mr. Cockerell, who sent his MS. to be included in this article.

Kermes concinnulus, Ckll., n. sp.

"♀ scale 4 mm. long, $4\frac{1}{2}$ broad, $3\frac{1}{2}$ high; very convex, rounded in front, more or less flattened behind; flattened beneath, except a median anterior keel-like prominence. Colour lively ochreous. Surface shining, not speckled with black; segmentation very distinct, the sutures marked by bands and spots of dark brown and black, on the hind part by numerous pits. A median longitudinal groove, where the segmentation is obsolete, also partly marked out in black. Sutures not deep, nor are the segments strongly gibbous on each side of the median groove.

"Skin with many small round glands. Antennæ and legs very minute, short and stout.

"Antennæ bristly at tip, joints obscure." (Cockerell MS.)

Hab.—On oak (*Quercus macrocarpa*), at Manhattan, Kansas. Collected by J. B. Norton. Allied to *K. Cockerelli*, Ehrhorn, ined.

NOTES ON SOME SAWFLY LARVÆ, ESPECIALLY THE
XYELIDÆ.

BY HARRISON G DYAR, PH. D., WASHINGTON, D. C.

MACROPHYA FLAVICOXÆ, Nort.

Head light brown, almost orange on the vertex, a little dot at occiput, eye in a black spot; width, 1.8 mm. Body greenish white, not shining, a dusky black dorsal stripe and a very distinct velvet-black lateral one, broken into two square patches situated on the third and fifth annulets, connected by smoky shadings. The spots are broken up posteriorly and absent on joint 13. Dorsal band greenish black. Segments neatly annulate. feet on joints 6 12 and 13; anal plates immaculate. Towards the end of the stage the segments are faintly orange banded in the middle (on second and third annulets), the anal flap broadly orange.

Ultimate stage.—Head brownish with blackish apical shade, eye black. Body shining greenish waxen, no marks except the orange bands which persist rather distinctly, covering four annulets, apparently first, second, third and seventh, the segments 7-annulate, marked a little with tar-brown in the folds. Single brooded; found on the red-berried elder (*Sambucus racemosa*) at Jefferson Highlands, N. H., towards the end of July, resting curled on the back of the leaf. The larvæ pass the winter in cells in the earth. One ♂ specimen was bred, which was submitted to Mr. MacGillivray, who labelled it with doubt, "n. sp., near *flavicoxæ*." I prefer not to consider it distinct for the present. The specimen is in the U. S. National Museum, marked "61."

MACROPHYA EXTERNA, Say.

Stage III. (?)—Head pale testaceous, a little darker on the vertex, a large black spot covering the eye; width, .9 mm. Body tapering posteriorly, finely annulate, translucent white; no marks, the dorsum appearing green from the food. Thoracic feet colourless; abdominal ones on joints 6-12 and 13.

Stage IV.—Head whitish, eye black, a dark shaded spot on the vertex; width, 1.2 mm. Thorax enlarged; body white, finely 7-annulate, the dorsum green from food.

Stage V.—Head whitish, eye in a large black spot, a large smoky black patch on vertex; width, 1.6 mm. Body rather opaque white, neatly 7-annulate, the food green; no marks. The larva curls with the tail raised over the back. Sits on the under side of the leaf.

Stage VI. —Head shining white, a large black patch covering, but mostly behind, the eye; a rounded grayish black patch on vertex, finely white punctured; width, 2.1 mm. Body white, dorsal and subdorsal broad blackish olive shade bands on joints 2-13; anal plate black. Abdomen neatly annulate; feet all white.

Stage VII.—Head as before, but slightly pruinose; width, 2.5 mm. Dorsum to spiracles black, leaden or greenish centrally, the colour diluted on joint 2 anteriorly and before the black anal plate. Feet all white; a black patch on the lower subventral fold. Segments neatly 7-annulate.

Stage VIII. (ultimate). — Head sordid pinkish, waxen, shining; width, 2.4 mm. Body the same colour, with a darker dorsal band and broken lateral one; segments 7-annulate.

Single brooded, forming cells in the earth. Found on the hickory at Bronx Park, N. Y., and Bellport, Long Island, during July.

Determined by Mr. Ashmead, from one bred ♀, as a variety of *M. externa*. Specimen labelled "8 P."

According to Mr. W. H. Ashmead's classification, the described species of Xyelidæ are as follows:

MACROXYELA, Kirby.

1. *ferruginea*, Say.
2. *tricolor*, Nort.
3. *infuscata*, Nort.
4. *aenea*, Nort.

MEGAXYELA, Ashmead.

5. *major*, Cress.

PLEURONEURA, KONOW.

6. *avimgrata*, Dyar.

MANOXYELA, Ashmead.

7. *californica*, Ashm.

XYELA, Dalman.

8. *minor*, Nort.

Genus MACROXYELA-

The larvæ of this genus are all unknown. The long ovipositor of the ♀ suggests an internal feeder.

Genus MEGAXVELA.

The larvæ of *M. major* proved hard to rear, and only imperfect specimens were obtained ; but the identification is nearly certain.

The larvæ are exposed feeders, gregarious on the young leaves of hickory in May, conspicuously coloured yellow with black spots. Both thoracic and abdominal feet are present, but are very small and hardly functional, the larvæ resting curled around a portion of leaf or stem, and wriggling about with the help of a few inconspicuous threads of silk.

Egg cuts irregular, somewhat distant, each a yellowish area on one side of the midrib ; the upper epidermis partly separated and brownish in an area of nearly 3 mm. ; lower epidermis a little swollen and yellowish in this area. No distinct cut remaining after the larvæ hatch.

Stage II.—Head black, with long antennæ ; width, .6 mm. Body whitish yellow, with black tubercles as in the next stage.

Stage III.—Much as in the next stages, the anal plate elevated and black, but no black spot on joint 13, the upper two spots of third annulet joined. Width of head, .8 mm.

Stage IV.—~~Head~~ Head, 1.2 mm. The same ; there is no black mark on the cervical shield.

Stage V.—Head, 1.8 mm. The same.

Stage VI.—Head rounded, prominent, proportionately small ; antennæ long, 5-jointed ; shining black, antennæ and palpi white ringed in the joints ; width, 2.2 mm. Body segments 4-annulate, the first a small dorsal arc, the rest large, reaching subventral folds ; spiracle on second. Colour, opaque shining yellow, a little clearer in the folds of the annulets. A black cervical mark, truncate before, widened and trilobate behind ; thoracic feet, a large patch on joint 13 anteriorly, besides the anal flap on its entire upper side, including the punctured, swollen, suranal prominences and the tubercles, shining black. Tubercles rather large, but slightly elevated, minutely piliferous ; four on second and third annulets above spiracle, two on fourth annulet, lateral, and one on each subventral fold. A faint dorsal, blackish shade between the uppermost tubercles, sometimes distinct. Abdominal feet small on joints 6-12 and 13. Single brooded, no ultimate stage. The larvæ leave the trees by the end of May, enter deeply into the earth, and form fragile cells.

Genus PLEURONEURA.

I have elsewhere described the larva of *P. aviingrata*, with the structure and habits of the preceding, but solitary and coloured to resemble the excrement of birds.

Genus MANOXYELA.

Unknown in the larval state, but not improbably similar to the next.

Genus XYLEA.

The imago of *X. minor* is found abundantly on the pine (*Pinus virginiana*) very early in the season, in February and March, in the vicinity of Washington, D. C. The larva (or what I believe to be the larva, as it has not yet been bred) occurs in the staminate aments of this tree, feeding concealed, but not a true internal feeder, as it does not attack the stem or bracts, so far as I can make out, except to form an aperture at emergence. Probably they feed on the young pollen. The larvæ leave the aments before they blossom, during April, drop to the ground, which they enter for some distance to form hibernating cells. There is but one brood in the year, the April larvæ yielding the imago the following February.

Larva.—Head small, rounded, nearly white, faintly brownish, especially around the mouth, eye very small, black; antennæ distinct and quite long; width about .4 mm. Body subcylindrical, venter a little flattened; subventral folds moderately distinct. Thoracic feet short and conic, functionless; abdominal ones wanting. Segments obscurely 3-annulate; anal plate round, slightly projecting, somewhat cornified and brownish, smooth; joint 13 slightly transversely ridged, sloping posteriorly. Thorax somewhat thickened, the whole body quite robust. All opaque white, waxy, no marks. The skin is transparent, but the alimentary canal lined with fat-granules produces the opacity.

From the foregoing a definition of the Xyelid larva would read as follows: Sawfly larvæ with prominent head and moderately long, distinct antennæ. Thoracic feet reduced; abdominal ones rudimentary or absent, number as in the Tenthredininae. Segments with few annulets (three or four), the tubercles, when present, several haired and situated in two and a half rows transversely on the spiracular and two following annulets; the half row the most posterior.

Apparently most nearly allied to the Lydiidæ, but without the anal stylets, and spinning little or no silk.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS,
U. S. NATIONAL MUSEUM.

(Paper No. 2.)

Series I.—XYLOPHAGA.

FAMILY I.—ORYSSIDÆ.

This group was recognized as a sub-family by Newman as early as 1834, and as a distinct family by Haliday in 1839. It is represented at present by a single genus, *Oryssus*, Latr., which is apparently the stem from whence some of the parasitic Hymenoptera originated; *i. e.*, the Megalyridæ, Stephanidæ, etc.

I have now, however, the pleasure of indicating below another genus, indigenous to Africa.

Although comparatively few species are described in the group, it yet appears to be widely distributed, species having been found in North, Central and South America, Europe, Africa, Asia and Aru, in the Malay Archipelago.

After I had sent my MS. of this family in for publication, I found that Mr. F. W. Konow, in his paper entitled "Systematische und Kritische Bearbeitung der Chrysiden—Tribus Oryssini,"* which I had not seen, had already given a revision of the genera. In this valuable contribution, Konow recognized four genera, three of which were here described for the first time. One of these, *Chalinus*, I had also indicated as new in my table under the name of *Chrysoryssus*, based upon a specimen of *Oryssus imperialis*, Westwood, in the National Museum, taken by Mr. Rolla P. Currie, March, 1897, at Mount Coffee, Liberia, Africa. It is one of the most brilliant of phytophagous insects, resembling in its metallic green colour many of the Chrysidæ.

The genera *Ophrynopus* and *Mocsarya* are unknown to me; the former occurs in Mexico, South America, and Aru, the latter being represented by a single species, *M. metallica*, Moes.; from Sambawa, Sunda Island.

The four genera recognized by Konow may be easily distinguished by the aid of the following table:

Table of Genera.

Face without carinæ; body not metallic.....	4.
Face with 2-4 carinæ; body usually metallic....	2.

* Természettudományi Füzetek, etc., XX., 1897, p. 602.

2. Facial carinae 2-4 and *divergent* anteriorly.....3.
 Facial carinae 2 and *convergent* anteriorly.
 Submedian cell in hind wings shorter than the median, the transverse median nervure joining the median vein before the origin of the cubitus, the discoidal transverse nervure present; anterior tibiae with a deep emargination just before apex; hind tibiae with the outer edge serrate.....*Chalinus*, Konow.
3. Face bicarinate; discoidal cell petiolate; lanceolate cell widely contracted.....*Ophrynopus*, Konow.
 Face quadricarinate; discoidal cell sessile; lanceolate cell petiolate.....*Mocsarya*, Konow.
4. Front wings with the lanceolate cell longly contracted; submedian cell in hind wings much longer than the median, the transverse median nervure uniting with the median vein far beyond the origin of the cubitus; transverse discoidal nervure always wanting. *Oryssus*, Latreille.

Oryssus, Latreille.

The following is apparently an undescribed species new to our fauna:

Oryssus thoracicus, n. sp.—♂. Length, 4.75 mm. Head, antennae except the first five joints, the apical joint at apex, and the abdomen are black, the thorax, first five joints of antennae with the apex of the last, and the legs, red; the anterior tibiae beneath are dusky with a white streak at base; the middle tibiae have a white streak behind; while hind tibiae are blackish, with a white streak at basal half behind. The wings are sub-fuscous, paler toward base.

Hab.—Santa Cruz Mts., California.

Described from a single specimen.

FAMILY II.—SIRICIDÆ.

This family is also widely distributed throughout the world, although represented by comparatively few genera. The family may be separated into two subfamilies as follows:

Table of Subfamilies.

- First transverse cubitus usually originating from the basal nervure; hind wings with a complete anal cell; hind tibiae with two apical spurs..... Subfamily I., Siricinae.
- First transverse cubitus not originating from the basal nervure, but from the cubitus; hind wings without a complete anal cell; hind tibiae without or with only one apical spur..... Subfamily II., Tremecinae.

Subfamily I.—SIRICINÆ.

Table of Genera.

Third joint of antennæ usually a little shorter than the fourth or not longer; process of the last dorsal abdominal segment long, widened before apex; head more or less marked with yellow or white *Sirex*, Linné.

Third joint of antennæ longer than the fourth; process of the last dorsal abdominal segment shorter, triangular, and equally thickened to apex; head wholly black or blue-black *Paururus*, Konow.

Paururus, Konow.

To this genus belong *Urocerus Abbottii*, Kirby; *U. apicalis*, Kirby; *U. cyaneus*, Fabr.; *U. Edwardsii*, Br.; *U. gracilis*, Westw.; *U. hirsutus*, Kirby; *U. nigricornis*, Fabr.; and *U. zonatus*, Nort.

The following is new :

Paururus pinicolus, n. sp.—♀. Length to tip of process, 18–19 mm.; to tip of ovipositor, 23–24 mm. Head, thorax and dorsal abdominal segments 1–4, or at least more or less of the fourth, especially at the sides, all ventral segments, sheaths of the ovipositor, and the legs, blue-black; rest of abdomen red. Process triangular, serrated at sides, its tip and beneath blackish. Wings dark fuliginous; the costal vein to stigma and the stigma within, ferruginous; rest of veins black or piceous. Antennæ 19-jointed, black, a little longer than the head and thorax united. The head and thorax are closely punctate, opaque and well clothed with black pile.

Hab.—Jacksonville, Fla.; Washington, D. C.; and Morgantown, W. Va.

The specimens from West Virginia were sent me by Prof. A. D. Hopkins, who informed me he took them boring in pine (*Pinus*, sp.). The others were captured by myself in November and December, several years ago.

Subfamily II.—TREMECINÆ.

Table of Genera.

Front wings with four submarginal cells 2.

Front wings with three submarginal cells.

Antennæ filiform, multiarticulate, the third joint longer than the fourth; tarsi slender, cylindrical, the basal joint of hind tarsi shorter than their tibiæ *Xeris*, Costa.

Antennæ short, filiform, 5- or 6-jointed, the third joint shorter than the fourth ; basal joint of hind tarsi longer than their tibiæ, much flattened and produced outwardly at apex beyond the second joint. *Teredon*, Norton.

2. Antennæ short and equally thickened or somewhat thicker before apex, the third joint usually a little shorter than the fourth, or at least no longer ; hind tarsi dilated in ♂ *Tremex*, Jurine.

Xeris, Costa.

To this genus belong *Urocerus caudatus*, Cr., and *U. Morrisoni*, Cr.

FAMILY III.—XIPHYDRIINÆ.

Most European and American writers have placed these insects with the Siricidæ, but their *habitus* is quite different, and the characters used in my table readily distinguish them from the true horntails.

The Swedish entomologist, C. G. Thomson, in 1871, first separated them from the *Siricidæ* as a distinct tribe, and in this he has been followed by Cameron and Konow.

I have recognized two subfamilies separated as follows :

Table of Subfamilies.

Front wings with one submarginal cell. Subfamily I., Derecyrtinæ.

Front wings with two submarginal cells Subfamily II., Xiphydriinæ.

Subfamily I.—DERECYRTINÆ.

This group is represented by a single genus, known at present to occur only in Central and South America.

Front wings with four submarginal cells. *Derecyrta*, Smith.

Subfamily II.—XIPHYDRIINÆ.

Three distinct genera are now recognized in this group, all being found in our fauna. They may be separated as follows :

Table of Genera.

Front wings with three submarginal cells. 2.

Front wings with four submarginal cells.

Lanceolate cell contracted beyond the base and closed. *Brachyxiphus*, Philippi.

Lanceolate cell subcontracted, but still open. . . *Xiphydria*, Latreille.

2. Lanceolate cell contracted and uniting beyond the base *Konowia*, Brauns.

FAMILY IV.—CEPHIDÆ.

This group was first treated as a distinct family by that master systematist, A. H. Haliday, as early as 1839.

Dr. Von Dalle Torre has credited the group to Westwood, evidently without having observed that Westwood, in his Introduction, merely accepted the views of Haliday, treating the group, however, as a sub-family instead of a family.

The genera have been recently tabulated by Konow as follows :

Table of Genera.

First joint of flagellum not or scarcely longer than the second, the flagellum towards tip more or less clavate.....5.

First joint of flagellum distinctly longer than the second, the flagellum towards tip not thicker than at base.

Hind wings with a complete cubital cell ; hind tibiæ with one or two spurs before tip.....2.

Hind wings without a complete cubital cell ; hind tibiæ without spurs before tip ; last ventral abdominal segment in ♂ without an emargination..... *Caenocephus*, Konow.

2. Antennæ thickened at the middle.....3.

Antennæ filiform, uniformly thickened, or with joints 3-5 slightly compressed.....4.

3. Abdomen short and thick, at the most about half the length of the thorax ; antennæ shorter than the head and thorax united, distinctly thickened before tip ; last ventral segment in ♂ ending in a short thickened knob, produced upwards into a distinct process, the penultimate ventral segment normal..... *Pachycephus*, Stein.

Abdomen long, fully twice as long as the thorax ; antennæ longer than the head and thorax united, feebly thickened at the middle ; last ventral segment in ♂ emarginate at apex, the penultimate with a transverse impression, clothed with erect black bristles... *Syrista*, Konow.

4. Hind tibiæ with a single spur before the tip ; antennæ with joints 3 and 4, and sometimes 5, compressed, the following to apex, of nearly an equal thickness..... *Macrocephus*, Schlecht.

Hind tibiæ with two spurs before the tip ; antennæ rather slender, filiform..... *Janus*, Stephens.

5. Pronotum quadrate, longer than wide, with the head thickly punctured, flat, scarcely emarginate behind ; antennæ long, very feebly thickened toward apex ; hind tibiæ usually with only one spur before the tip..... *Calameuta*, Konow.

yellowish band at base, shading into rufous at apex; the fourth has a yellowish blotch laterally towards the ventral surface; the fifth is narrowly yellowish at base, but laterally broadening to the venter, so that at the sides near the venter, except an irregular triangular black mark which encloses the spiracles, it appears almost entirely yellow; the dorsal or apical part of the segment is rufous; the sixth has two small yellowish marks above, but below or at the sides from the spiracles it is yellow; the seventh, except a spot at sides close to the venter, is black; the eighth is mostly black, with a large yellow spot at the reflexed apex, and a yellow spot on the margin just below it; venter black, except the terminal segment laterally at apex and the margins of the hypopygium, which are yellow; hind tibiae with two spurs before apex.

Hab.—Milwaukee, Wisconsin.

Described from a single ♀ specimen taken by Dr. Sigmand Graenicher, and in honour of whom the species is named.

THE DESCRIBED SPECIES OF XIPHIDIUM IN THE UNITED STATES AND CANADA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The following table, made as simple as possible, and based almost exclusively upon the female sex, will serve to distinguish the species of Xiphidium hitherto described or recorded from the United States and Canada. It includes only the species of Xiphidium proper; *i. e.*, those of slender form with straight or nearly straight ovipositor, excluding the stouter species with distinctly arcuate ovipositor, commonly referred to Orchelimum, though both are classed together by Redtenbacher.

TABLE OF THE DESCRIBED SPECIES OF XIPHIDIUM.

- a*¹ Under side of hind femora armed with several spines; ovipositor longer than hind femora..... *ensiferum* Scudder.
- a*² Under side of hind femora with at most a single spine.
 - b*¹ Ovipositor at least half as long again as hind femora.
 - c*¹ Tegmina much longer than body.... *attenuatum* Scudder.
 - c*² Tegmina no longer than body.
 - d*¹ Tegmina nearly or quite covering the abdomen..... *Scudleri* McNeill.
 - d*² Tegmina scarcely longer than the pronotum..... *strictum* Scudder.

b^a Ovipositor at most but little longer than the hind femora.

c^a Ovipositor as long as or longer than the hind femora.

d^a Tegmina covering or almost covering the abdomen *nigropleura* Bruner.

d^a Tegmina hardly or not longer than the pronotum *saltans* Scudder.

c^a Ovipositor distinctly shorter than the hind femora.

d^a Tegmina much longer than the body, and wings still longer *fasciatum* DeGeer.

d^a Tegmina not reaching tip of abdomen, and wings still shorter.

e^a Ovipositor nearly or quite straight, and fully three-fourths as long as hind femora.

f^a Larger; hind femora nearly or quite 16 mm. long. Ovipositor attenuate at tip as much by the curve of the upper as of the under edge *gossypii* Scudder.

f^a Smaller; hind femora hardly or not exceeding 13 mm. in length. Ovipositor attenuate at tip by the curve of the under edge only *brevipenne* Scudder.

e^a Ovipositor distinctly though feebly arcuate, and less than three-fourths as long as the hind femora *nemorale* Scudder.

It may be added that *X. modestum* Bruner (March, 1891), and *X. taeniatum* Redtenbacher (July, 1891), are synonyms of *X. saltans* Scudder (1872); and *X. curtipenne* Redtenbacher (1891), the same as *X. nemorale* Scudder (1875).

PHILANTHUS HENRICUS—(P. 153).

This species should be credited to Mr. Dunning alone; I neither described nor named it. I did send Mr. Dunning a few Philanthidæ, with MS. names and descriptive notes, and these, in the event of publication, should be credited jointly; but *P. henricus* is not my species in any sense. The type specimen, I should add, was collected by Professor Townsend.

T. D. A. COCKERELL.

SOME NEW SPIDERS.

BY NATHAN BANKS, WASHINGTON, D. C.

Pæcilochroa minuta, n. sp.

Length ♂, 4 mm.; ceph., 1.7 mm. long, 1.1 broad, patella plus tibia IV., 1.6 mm. Cephalothorax uniform reddish yellow, legs and palpi a trifle paler, except metatarsi IV. which are reddish brown; sternum yellowish; abdomen black, with short white hairs and some longer black ones at base; venter with a pale streak each side; spinnerets red-brown. Head narrow; posterior eye row slightly recurved, longer than anterior row, the P. M. E. round, their diameter apart and as near the P. S. E. as to each other, equal in size; eyes of anterior row subequal, all close together. No plate under fang of mandibles. Legs quite hairy, but the scopulas not dense; femora with three or four very large spines above, each spine longer than the posterior eye row; no spine above on tibia IV., one below at tip of tibia I. Sternum narrow, nearly twice as long as wide. Abdomen slender, no wider than cephalothorax, spinnerets large, an interrupted ventral fold near their base. The tibia of the male palpus has on the outer tip a large, stout, slightly curved projection one-half the length of the tarsus and blunt pointed at tip; the palpal organ is swollen near middle, the style is short.

One male; Brazos Co., Texas.

Cybaodes (?) incerta, n. sp.

Length ♀, 4.5 mm. Cephalothorax brownish yellow, darkest in front and black around each eye; mandibles rather darker than cephalothorax; legs and sternum pale yellowish, abdomen pale gray, thickly clothed with rather long white hairs and longer black bristles, mostly at base. Cephalothorax once and a half longer than wide, broad and low in front. Eyes in two rows close to each other, hind row about straight, longer than the anterior row; the posterior eyes larger than the anterior eyes; P. M. E. closer to equal P. S. E. than to each other; A. M. E. about as close to each other as A. S. E., dark coloured. Clypeus narrow; mandibles large, porrect, slightly divergent, front margin with three teeth, hind margin with two smaller teeth, fang long and stout; maxillæ twice as long as broad, rounded at tip, scarcely inclined, plainly obliquely impressed; lip longer than broad, rounded at tip. Sternum longer than broad, truncate in front, sides rounded; legs rather large, of moderate length; all femora shorter than the cephalothorax, clothed with hairs and spines, tibia I. with one spine near base, two towards tip; metatarsus I.

with two near base, two near middle, and one at tip ; tibia II. with one at base and one towards middle, three under metatarsus II. ; tibiae III. and IV. with (under) two very long ones at base, two long ones at middle, and two much shorter at tip ; above with several ; metatarsi with many long and stout spines ; three claws, the pair with teeth below. Abdomen once and a half longer than broad ; spinnerets are before the tip, two-jointed, lower pair the longest, at base between them is a hump, and at base of this is a transverse furrow ; the epigynum shows a short, spoon-shaped septum, leaving each side a curved reddish mark.

From debris on salt crust ; Salton, Calif. ; March, 1897. (H. G. Hubbard.) I am uncertain of its position, but think it very near *Cybæodes*.

Theridium cinctipes, n. sp.

Length ♂, 1.3 mm. ; femur I., 1.1 mm. long. Cephalothorax yellow-brown, margins black, blackish around eyes and extending back to the dorsal groove ; abdomen mottled with black and white, two pairs of small basal white spots, behind these a white stripe with serrate sides gradually narrowing to the spinnerets ; sides with three or four white spots ; venter black, with two prominent silvery spots ; sternum blackish ; legs white, with black bands at ends of joints and on the middle of tibia I. Abdomen moderately high, one and a half times as long as broad ; leg I. very long, femur I. more than twice as long as femur III., tibia I. much longer than the cephalothorax. The male palpal organ is short and compact. There is a transverse mark across its base which has an upward projection near its outer end ; a circular dark bulb is nearer the tip on the outer side, and from it a slender dark tube extends below, across and upward toward the tip, where it ends in a short, pointed sheath ; near base of the sheath there arises a larger, curved, pointed process.

Brazos Co., Texas.

Theridium subterraneum, n. sp.

Length ♀, 3 mm. ; tibia I., 1.8 mm. Pale yellowish, legs rather darker, a dark trifurcate mark on the cephalothorax ; abdomen gray, with some blackish transverse patches in two rows on the dorsum. Cephalothorax highest behind eye-region ; P. M. E. slightly farther from each other than from the P. S. E. ; A. M. E. smaller and less than their diameter apart ; legs quite long, femur I. longer than the cephalothorax, abdomen sub-globose, longer than broad, and as high as broad, clothed (as elsewhere) with long hairs. Epigynum shows a triangular area, with

a slender point in front, behind is a transverse area pointed in front, and in front are two dark spots connected to the posterior area by a reddish line. Taken from graves, Washington, D. C. (Dr. Motter.)

Nesticus cavicola, n. sp.

Length ♂, 1.5 mm. Wholly pale whitish, clothed with long bristly hairs. Cephalothorax rather short and broad; six eyes, sub-equal in size, A. M. E. not visible; posterior row nearly straight, the P. M. E. farther apart than from the P. S. E.; S. E. touching; sternum broad, sides rounded; legs long, all femora longer than the cephalothorax, hairs on legs longer than the diameter of the joints; abdomen pointed behind, one and a half times longer than broad. Femur of male palpus rather long, palpal organ large, a projection of tibia broadest near tip and bifid, one branch is cleft; the style is long, curved around tip of bulb, from the tip of bulb there projects outward a pointed spine, and below is another projection tipped with a short black hook. From a cave, Chiricahua Mts. (Wood Canon), Ariz., June, 1897. (H. E. Hubbard.)

Erigone albescens, n. sp.

Length ♀, 1.8 mm. Cephalothorax, legs, mandibles, and sternum uniform yellowish, abdomen uniform whitish gray; eyes on black spots. Head rather elevated; posterior eye-row procurved, the P. M. E. about as far from each other as from the equal P. S. E.; A. M. E. small, and close together. Mandibles of moderate size, vertical, armed along their lower front margin with several teeth, and behind with a row of denticles, sternum broad, sides rounded, blunt pointed behind; legs of moderate length, with many hairs and a few spines, one above on tibia IV.; abdomen oviform, clothed with scattered stiff hairs, which arise from minute yellowish dots; epigynum shows two curved dark lines approaching each other from behind, and a darkish spot outwards from their tips. From the inside of coffins in graves opened during the transfer of a cemetery, Washington, D. C. (Dr. Motter.)

Philodromus pacificus, n. sp.

Length ♀, 4.1 mm. Cephalothorax yellowish, darkest on the sides, which are densely mottled and lineate with red-brown, a white v mark on the middle with its apex near the dorsal groove, dorsum of abdomen white, showing two basal pairs of yellowish muscular spots, sides of abdomen broadly suffused with red-brown from base to tip, venter whitish; femora, patellæ, and tibiæ pale reddish brown above, lighter below, distal joints yellowish. Sternum light yellowish, the body is full,

quite broad and short. Eyes not widely separated, P. M. E. as close to P. S. E. as to A. S. E., the A. M. E. are not very much nearer the A. S. E. than to each other. Abdomen twice as long as the cephalothorax. Femur II. longer than the cephalothorax. The epigynum shows an area longer than broad, with nearly parallel sides, divided by a rather narrow septum widened at its tip, the apical part of the sides are dark circular, and the basal part light and oval. Olympia, Washington. (T. Kincaid.)

NOTES ON COLLECTING AT BLOOM.

BY A. W. HANHAM, WINNIPEG, MAN.

At Brandon, Manitoba, in 1896, some very successful collecting was done on the prairies and open hillsides surrounding the town. Except in the valley of the Assiniboine River, which is still well wooded, the country around Brandon is very open—regular prairie country—with, of course, a good proportion under cultivation, it being one of the good wheat-growing districts of Manitoba.

However, there is plenty of good collecting ground to be found in almost any direction, and within a few minutes' walk. A short account of collecting at bloom may be of interest to our entomological readers, especially to those who have never visited "the boundless prairies of the West." Or there may be some who have had that pleasure, but have never tried collecting in this way, for lack of opportunity.

In 1896, I was at Brandon from July 9th to August 4th, and in 1897, from August 5th to 28th.

In 1896, I had my first evening collecting on the 15th; in previous years I had often collected off flowers towards dusk, and that was my procedure on this evening. It was on my homeward way that the inspiration came to me to sweep the clumps of bloom I came to, and the result astonished me, and led to the practice of collecting in this way on all available evenings.

It was quite too dark to see things moving on the wing or at rest on the flowers, and the only way to find out the contents of the net, after sweeping, was to hold it up against the sky line; even then it was generally impossible to tell what the catch consisted of, though the moths in the net could be seen and counted. After sweeping a few heads of bloom, it was nothing out of the way to find a dozen or more moths in the net, and it was surprising how little struggling they did either in the

net or when bottled. Most of the Noctuids contented themselves with crawling about the net, and quite a number feigned death; the presence of a *Plusia* in the net could almost always be told by the noise it made in flying.

First bottling the lively ones as they flew up the side of the net, I would then shake or gather the rest into a corner, and then, putting my wide-mouthed bottle in, I would run it up the slope of the bottom side of the net and everything would tumble or be scooped into it. Of course, during the whole process the net had to be held up against the sky, and I managed to keep it at the right elevation and steadiness by gripping the end of the stick between my knees. This allowed me the free use of both hands for securing the catch.

Even on quite cool evenings—when before dark hardly a thing had been noticed on the wing—quite a number would still be swept off the flowers, and they were even more sluggish than usual.

As in “sugaring,” the number of species taken, outside of the Noctuidæ, did not amount to anything.

As the catch of the evening was, to a great extent, an unknown quantity—as to the species taken, not the numbers—the anticipation of the “output” on arrival home was decidedly pleasurable, and, till the novelty wore off, rather exciting.

Plusias were not taken in any great abundance by this method; in fact, the majority of those captured during my visit were netted before dark.

The plants or flowers off which the moths were swept were as follows:

Wild bergamot or horsemint (*Monarda fistulosa*, var. *mollis*).

Scotch thistle (*Cnicus undulatus*).

Spreading dogbane (*Apocynum androsæmifolium*).

Wild sunflower (*Helianthus rigidus*).

Species of golden-rod, of which *Solidago rigidus* appeared the most attractive.

Of the above, the wild bergamot, while it lasted, was, without doubt, the most alluring. It seems to grow pretty generally over the prairie, both in the open and in open bush, especially among clumps of silver-bush.

Unfortunately, during my second visit very little of it remained in bloom, but the wild sunflower was everywhere in profusion.

On July 15th I took my first specimen of *Plusia insolita*, and on

the 25th, the second ; on July 23rd a *Plusia biloba* (such a beauty), and on the 24th I secured *Deva purpurigera*.

In July, the most abundant Noctuids were: *Noctua fennica*, *Carneades flavicollis* (a good species) and *tessellata*, *Hadena devastatrix*, and *Leucania commoides*; and of these *flavicollis* was easily the most plentiful, and every evening, after the examination of the contents of the bottles, it was thrown out by the score.

A few of the best captures in July were: Several species of *Rhynchagrotis*; *Noctua patefacta*, *normaniana* and *atricincta*; *Carneades pleuritica*, *basalis*, *silens* and *redimicula*; *Mamestra purpurissata*; *Orthosia Conradi*? and *Cucullia florea*. In August, *Noctua collaris*, *Hadena stipata* and *transfrons*, *Oncocnemis atrifasciata*, *Caradrina extimia*, etc.; and the following predominated then: *Noctua baja*, *Feltia subgothica* and *jaculifera*, and *Carneades insu'sa*; and a large, handsome pyralid, *Eurycreon sticticalis*, was very common at flowers at night, as well as during the day.

Both *Noctua collaris* and *Hadena transfrons* seemed to have a decided preference for *Solidago rigidus*.

At Winnipeg there is but little open prairie near the city, or easy of access, consequently few attempts have been made at this style of collecting. Mosquitoes, too, are much more in evidence here, and evening collecting, for this reason, until well on in August, has to be abandoned.

The Canada thistle (*Cnicus arvensis*) is a regular pest in and around Winnipeg; when in bloom it is very attractive. I have taken *Plusia ni* and *Californica* off it (July 30th), and *thyatiroides* (Aug. 15th), in 1895, and in 1896 (Aug. 10th), *Orthosia euroa* was very common; by sweeping after dark I secured this species in abundance, and only kept a portion of those netted.

On August 11th (1896), I got five specimens of *Noctua collaris*, all off *Solidago rigidus*.

On August 18th and 24th (1896), I captured the same number of *Plusia thyatiroides* off a tall wild sunflower (*Helianthus scabra*) growing in dark woods near Elm Park. I was "sugaring" on these evenings, and some of my sugared trees were within a few feet of the flowers, but these *Plusias* apparently were not attracted to the sugar in the least.

I have never yet captured a *Plusia* "at sugar," but others, who have done more "sugaring" than I have, may have taken them in this way.

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE
GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, N. Y.

(Continued from page 164.)

DIASTICTIS BENIGNA, n. sp.

Expands 23 mm. Palpi rather long, heavy, drooping, blue-gray; front, thorax and abdomen blue-gray, the latter whitish lined posteriorly on segments. Fore wings bluish-gray, lightest on middle field, mixed with some black scales; basal line faint or obsolete, marked by a black spot on costa; middle line beginning with black spot at costa, then through black lengthened discal spot, then obsolete; outer line with black spot at costa, otherwise obsolete; outer field darker towards margin, with a large brown submarginal shading between 3 and 5. Hind wings even, smooth, blue-gray. Beneath dark bluish fuscous on all wings, becoming blackish along outer margins; costa of fore wings speckled with black and gray.

Los Angeles Co., Cal. Type in National Museum. An insect very much in appearance like the Eastern *Macaria minorata*, Pack., but the fore wings are not falcate, the hind wings are not angled, and the palpi are much longer and heavier. The antennæ of *D. benigna*, here described, are wanting, so the generic reference cannot be certain; but as there is no hair pencil on hind tibiæ in ♂, it cannot be either *Sciagraphia* or *Macaria*, as I define them. Type No. 3959.

DIASTICTIS SERICEATA, n. sp.

Expands 24-26 mm. Palpi, front and thorax, white; abdomen white, with fuscous stain, with many intermixed black scales. Fore wings white, with long light fuscous cross striations, which become many exceedingly fine, yet sharply distinct, though often broken, cross lines, giving an appearance of solid colour to the naked eye; a black, geminate, straight, basal cross line; another outward, less distinct, also geminate, nearly straight, with a band of reddish-brown between; discal spots black. Hind wings light fuscous, becoming grayish outwardly; marginal line of black spots on all wings. Beneath fuscous gray, coarsely striated with fuscous on hind wings, outer margins darkest. The fore wings have a smooth, silky appearance, with an apparent broad central band, even in width across the wing.

Colorado Desert, from Hy. Edwards; Arizona, from Dr. Kunzé. The latter taken from Aug. 29 to Sept. 9, 1896.

JUBARELLA, n. gen.

Palpi light, small ; front quadrate, somewhat bulging ; antennæ of ♂ simple, flattened, very finely ciliate ; thorax light, tufted in front, patagiæ long scaled ; abdomen slender, untufted ; wings broad, extended, even, rounded ; fore wings without fovea below in ♂, 12 veins, 10 and 11 from cell, anastomosing with 12 and each other ; hind wings, 8 veins, 5 undeveloped. Legs rather long, fore tibiæ unarmed, hind tibiæ with two pairs of spurs, not swollen, without hair pencil. ♀ unknown, possibly wingless.

JUBARELLA DANBYI, n. sp.

Expands 48 mm. Palpi and front black ; thorax black, tuftings whitish at ends ; abdomen blackish-gray, interlined ; wings even, blue-gray, with scattered black scales, these less and so the gray lighter in a broad sinuous band beyond discal spot ; a brownish shading towards apex and submarginally to inner margin ; discal spot white, with edging cloud on fore wings, black and prominent on hind wings ; the hind wings less blackened, and so generally lighter than fore wings ; fore wings with black dashes on veins 3, 4, 5 and 6 on outer space, hind wings with row of faint black dots outwardly on veins. Beneath gray-black striated ; fore wings with black outer line, brownish near apex ; hind wings with outer row of black spots.

Rosslund, Brit. Col. ; from Mr. Danby. A rather lightly scaled insect resembling *Coniodes plumigeraria*, Hulst.

SPODOPTERA KUNZEI, n. sp.

Expands 25-28 mm. Palpi and front whitish ochreous ; antennæ fuscous ; all wings whitish, evenly overlaid with light fuscous striations, without lines ; discal spots prominent, white by absence of striations ; thorax and abdomen white or with a fuscous tint ; beneath a glistening white, with a fuscous tint, with an ochreous shade along costa and margins. The abdominal tuftings which mark the genus are prominent, ochreous, shading to blackish.

Prescott and Senator, Ariz. ; from Dr. Kunzé, in whose honour the specific name is given.

ÆTHYCTERA LINEATA, n. sp.

Expands 35 mm. Front thorax and abdomen gray ; fore wings whitish, with scattered black atoms, these heavier on costa and sub-discal vein, making these distinctly apparent ; the scales darken by

quantity into blackish lines between veins 1 and 2, 3 and 4, and 4 and 5, the last reaching half the wing to outer margin; the second the heaviest and black, but shortest; the first nearly the whole length of the wing, and lightest. Hind wings white, silky; all wings thinly scaled, rather long and narrow. Beneath more smoky, the fore wings with the markings above fainter.

Glenmore Springs, Colorado; from Dr. Barnes.

ALCIS MAESTOSA, n. sp.

Expands 33 mm. Palpi black below, ochre above; front fuscous gray; antennæ dark fuscous; thorax fuscous gray, mixed with blackish; abdomen fuscous, blackish dorsally, and posteriorly on segments; wings broad, even fuscous, mixed more or less with black, with many of the scales loosely raised, and in the light showing as powdered white atoms; fore wings, basal line fine, black, rounded, somewhat angled at cell; outer line rather evenly wavy, fine, black, nearly parallel with outer margin; an outer line of intervenular blackish shadow spots, and a corresponding marginal line connecting with black marginal points, the veins on outer field being rather broadly smooth, fuscous in colour. Hind wings corresponding with fore wings, the black being heavier and less separate at veins, the basal line obsolete, the outer line wavy, dentate, rounded; the outer blackish spots edged outwardly with a dentate white line; marginal line of broken black spots; all discal spots present, black. Beneath fuscous blackish, the outer lines showing in black points on veins, the outer margin darker fuscous; discal spots present.

Label doubtful, either Ia. or Ga., probably the former; taken Apl. 22. Type in National Museum. Type No. 3942.

ALCIS LALLATA, n. sp.

Expands 45-48 mm. Palpi and front blackish; thorax bluish-gray, with black collar and edge to patagiæ; abdomen fuscous, with black scales mixed; fore wings a bright blue-gray, with black shadings and cross lines; basal lines well out, fine, geminate, bent, waved; a middle blackish shading with strong outer sinus just below black discal spot; outer line bent outwardly beyond cell, rather evenly scalloped its whole length; an outer line of faint whitish lunules; veins black at ends; hind wings gray fuscous, even, without lines, discal spots faint. Beneath smooth, light fuscous, slightly darker towards margins.

Senator, Aug. 20; Prescott, July 9; and San Francisco Mts., Ariz., July 26; from Dr. Kunze.

SELIDOSEMA LACHRYMOSA, n. sp.

Expands 30 mm. Palpi black, tipped with ochreous; front black; thorax blackish fuscous; abdomen blackish fuscous. All wings nearly uniform blackish fuscous, fore wings rather narrow, apex acute, outer margin rounded, inner margin long; inner line well out, rounded, a sinus at cell opposite discal spot, and a less one at vein 2; outer line beginning on costa near apex, strongly sinuous, the largest sinus outwardly at vein 3, and a short, almost angular one close to inner margin, whose middle the line reaches, or a little beyond it; the lines are fine, black, the outer faintly edged outwardly with gray; a faint whitish, sub-wavy, submarginal line nearly parallel with outer margin; discal spot rather large, oval, white. Hind wings triangular, both angles prominent and sharp, outer margin irregularly wavy; a faint discal shadow line; an outer fine, black, somewhat undulating line; discal spot distinct, white; marginal lines on all wings fine, black, broken. Beneath almost even blackish fuscous, smoother than above.

Los Angeles Co., Cal.; taken in July.

CLEORA SUBAUSTRALIS, n. sp.

Expands 42 mm. Palpi moderate, ascending, fuscous brown, black in front and at end; front dark smoky fuscous; summit fuscous brown; thorax dark fuscous, with a bluish tinge, behind lighter; abdomen ochre fuscous, stained and dotted dorsally with blackish, incompletely interlining the segments. Wings light brownish ochre, heavily and quite evenly overlaid with blackish patches and striations, giving a generally mottled appearance, enough separated basally and outwardly to give faint indications of rounded sinuate lines of ground colour; a lighter spot outwardly at vein 3; a large, lengthened, black discal spot, and a marginal line of rather heavy intervenular black points. Hind wings corresponding to fore wings, a lighter spot at vein 3, a faint zigzag lighter outer line, a lengthened black discal spot, and a line of black intervenular lunules. Beneath even light ochre brown; fore wings darkened basally along costa, and outwardly below apex; discal spots on all wings, long, black; some faint blackish striæ scattered on fore wings.

Cocoonut Grove, Florida. National Museum collection. The generic reference is provisional. Type No. 3960.

CLEORA PEDICELLATA, n. sp.

Expands 43 mm. Palpi rather long, porrect, rather slender, ochre, heavily marked with black, last segment black; front tufted, ochre

fuscous below, black at middle, and stained with reddish above; antennæ dentate, with two slender spines, quite long, from each segment, ochre brown, ringed with black; thorax ochre brown, mixed with blackish; abdomen ochre brown, the segments lined with black. Fore wings ochre brown, somewhat marked with black; basal line indeterminate, two outer lines quite oblique, wavy jagged, definite only on posterior half of wing, and anteriorly shown by venular spots; an outer submarginal line of black intervenular spots, this followed by a second quite indeterminate; black, large, rounded discal spot, and a marginal row of intervenular black spots; hind wings colour of fore wings, with seven blackish cross lines, the fifth from base being finer, more distinct, and more irregular than the others, which are quite even and subparallel; discal spot black, rather large, with a whitish lunule within; marginal line black, of scarcely confluent marks, each with an inner white edging. Beneath very much as above, but with a strong reddish tinge, the lines less distinct, and with an outer row of black spots on both wings. The wings above have scattered, pedicellate, upright scales, black at ends, and generally white on lower half; these form a distinct tuft at the discal spots on all wings above.

Cocoanut Grove, Florida. National Museum collection. I have the female only. The insect probably represents a very distinct new genus. Type No. 3958.

SELIDOSEMA CONFIGURATA, n. sp.

Expands 40 mm. Palpi and front blackish; thorax gray; abdomen ochre-gray, with dark fuscous interlining and dorsally; fore wings gray, with a bluish tint, with some washing of fuscous and scattered black scales; lines black, distinct; basal rounded, with a black dot within it at cell; middle line passing through large black discal spot, sinuous to inner margin; outer line very distinct, bent out sharply at cell, then rounded back subparallel with outer margin, coalescing between 1 and 2 with middle line, then separating to margin, outwardly last half with heavy shadowing; a subapical black dash; lines outwardly a little brownish; margin a little wavy, line black, heavier at ends of veins; hind wings, gray; a straight basal line, a distinct black extradiscal rounded line, and a submarginal shadow; margin somewhat wavy, black lined; beneath light fuscous, even in colour, the lines finely, but distinctly, produced.

Colorado; from Dr. Gillette.

[TO BE CONTINUED.]

BOOK NOTICE.

TWENTY-FIRST REPORT OF OBSERVATIONS ON INJURIOUS INSECTS AND COMMON FARM PESTS DURING THE YEAR 1897, WITH METHODS OF PREVENTION AND REMEDY. — By Eleanor A. Ormerod, London: Simpkin, Marshall, Hamilton, Kent & Co., 1898 (1s. 6d.), pp. 160.

We beg to offer our hearty congratulations to Miss Ormerod on the publication of the twenty-first of her annual reports. Twenty-one years is a long period for anyone to carry on a laborious work, but this talented and indefatigable lady has not only accomplished a most valuable and important work, she has done so without any assistance except that of her late lamented sister, and entirely at her own expense. On this side of the Atlantic reports of this character are published by the Government of the Province or State to which they belong, but in England no official recognition has been shown, and though the country has undoubtedly been saved hundreds of thousands of pounds by the instructions given in these Reports to the farmers and gardeners of Great Britain, whereby they have been able to intelligently cope with their insect foes, and employ the best methods of prevention of their attacks, yet no aid has been afforded her from the public purse. No recognition of the immense value of her work has been vouchsafed by the powers that be. But while officially ignored, Miss Ormerod's name and work are held in the highest honour throughout Great Britain, and treated by the press in every department with the utmost respect; and in many British colonies and several foreign countries her name is widely known and her talents fully recognized.

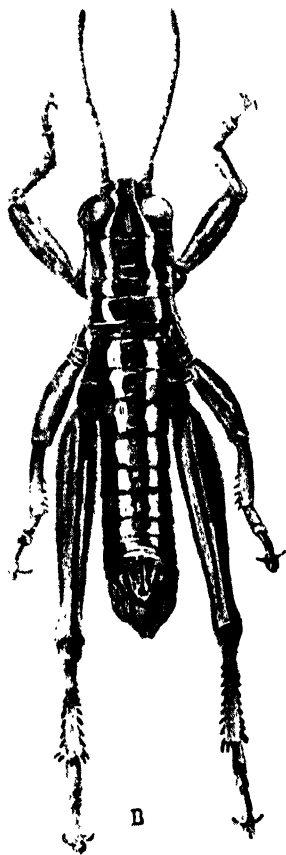
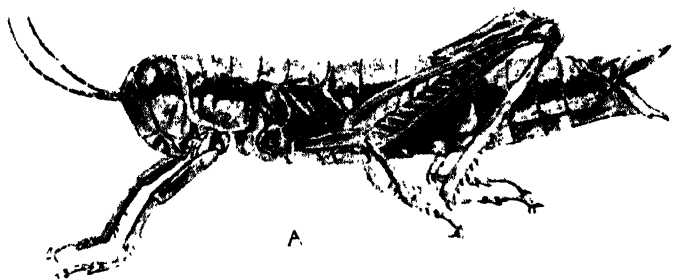
A single observer, however able and industrious, could not possibly pay attention to all the manifestations of insect injury throughout the British Isles, but Miss Ormerod has by degrees gathered together a corps of observers in every county and district throughout the United Kingdom, and is kept closely informed of all that causes injury or loss to crops or fruit, and to live stock as well. During the past year she received about 3,000 letters on entomological subjects, and with the aid of a secretary was enabled to attend to them all. She thus conducts at her own charges what ought to be a Division of Entomology in the Department of Agriculture at London.

In the report before us, thirty-six species of insects are dealt with and figured, their ravages described, and methods of prevention and remedy fully given. Several of them are familiar to us on this side of the Atlantic; e. g., Apple Codling Moth, Cockroaches, *Xyleborus xylographus*, Mediterranean Flour Moth (*Ephestia kuehniella*), etc.

From the care and accuracy which characterize her descriptions and figures, Miss Ormerod's work is of permanent value to economic entomologists everywhere, and her reports are always received with welcome and gratitude by those who have the good fortune to obtain them. That she may long be spared to carry on her admirable work is the earnest aspiration of her many friends.

C. J. S. B.

Mailed July 6th, 1898.



ASEMOPLUS NUDUS. NOV. SP.

The Canadian Entomologist.

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No. 8.

A NEW ALPINE GRASSHOPPER FROM WESTERN CANADA.

BY E. M. WALKER, TORONTO.

Among a large number of Orthoptera taken by myself during a trip to the Pacific Coast by the Canadian Pacific Railway there is one species belonging to the Melanopli which I was unable to determine from Scudder's "Revision" of the group, and could not even satisfy myself as to its generic place. I therefore sent a pair to Mr. Scudder, who informed me that it was a new species of *Asemoplus*, but that a change would be necessary in the description of that genus as given in his "Revision of the Melanopli" in order to receive my species. I had noticed the resemblance to *Asemoplus* in the extremity of the male abdomen, but the total absence of tegmina and other points of dissimilarity caused my uncertainty regarding its true generic position.

I have accordingly prepared the following description taken from 3 ♂'s and 5 ♀'s, of which 2 ♂'s and 1 ♀ were taken near Sandon, B. C., in the Gold Range, and the others on Mt. Piron, near Laggan, Alberta. *Asemoplus nudus*, n. sp.

Rather stout and strongly built; tegmina and wings entirely absent; dull olivaceous above in the ♀, black with two longitudinal dorsal yellow stripes in the ♂.

Frontal costa not prominent, fading before the clypeus, equal, sulcate at and below the ocellus, or sometimes throughout in the male, a little wider than the first antennal joint in the ♂, about half as wide again in the ♀. Vertex a little tumid, scarcely raised above the pronotum; fastigium rather steeply declivent, very slightly arcuate, about on a level with the eyes or sometimes a little below in the ♂, feebly depressed, considerably expanded anteriorly.

Interspace between the eyes half as broad again in the ♂, twice as broad in the ♀ as the first antennal joint. Eyes rather small, a little prominent in the ♂, but little longer than broad, subtruncate anteriorly, about as long as the infra-ocular portion of the genæ. Antennæ shorter than the hind femora, in the ♀ about as long as the head and pronotum,

in the ♂ nearly half as long again. Pronotum rather short, the sides nearly parallel in the ♂, but considerably divergent in the ♀, so that the posterior border is more than one-third as long again as the anterior. Disk broadly convex, passing into the nearly vertical lateral lobes without a trace of lateral carinæ. Prozona a little more than twice as long as the metazona, quadrate or slightly transverse in the ♀. Anterior and posterior margins of the disk truncate, the latter slightly emarginate. Median carina slight, nearly obliterated on the prozona, but distinct on the metazona. Posterior margins of lateral lobes but little oblique, forming a decided angle with the lower margin. Prosternal spine nearly vertical, short, conical, not very blunt. Interspace between the mesosternal lobes in the ♂ nearly half as broad again as long and nearly or quite as broad as the lobes themselves, in the ♀ twice as broad as long and distinctly broader than the lobes. Metasternal lobes rather distant in the ♂, more distant than the width of the frontal costa in the ♀. Legs rather stout; fore and middle femora tumid in the ♂. Abdomen with a distinct median carina. Extremity in the ♂ feebly clavate and a little upturned. Supra-anal plate three-fourths as broad at the base as long, triangular with an obtusangulate apex; sides gently emarginate, considerably elevated, median sulcus nearly percurrent, moderately deep, its bounding walls about as much elevated as the sides. Furcula consisting of a pair of minute rounded tubercles. In one specimen, which is the one figured, it is quite distinct and much better developed than in the others, in which it is almost obsolete. Cerci distinctly shorter than the supra-anal plate, about twice as long as the width at the base, compressed, styliform, tapering a little more rapidly in the basal than in the apical half. Subgenital plate rather large, conical, apical margins not elevated above the lateral margins, the latter parallel on their basal half, but narrowing beyond to the small mesially notched apex. Upper valves of ovipositor rather short, not narrowed at base, slightly falciform apically. In the specimen shown on the plate they are more than normally exerted.

Colour of Dried Specimens.—Female: Dull, rather dark olivaceous above, dull yellow tinged with olivaceous beneath. Face and lower half of the lateral lobes of the pronotum yellowish-green or olivaceous, more or less clouded with grayish olivaceous, especially on the clypeus and labrum; a broad piceous band starts from the middle of the posterior border of the eye, passes over the upper half of the paternal

lobes of the pronotum, then broadens until it reaches the abdomen, thence gradually narrowing until it disappears at about the last segment. Behind the pronotum it changes from shining piceous to rather dull black. Antennæ olivaceo-fuscous, paler at the base. Fore and middle legs olivaceo-fuscous, yellowish beneath. Hind femora reddish-brown internally, dull orange beneath, dull fuscous externally, with little or no indication of fasciæ above. Hind tibiæ luteous, more or less clouded with olivaceous, and all the colours are darker and duller than in the other specimens.

The male differs in coloration as follows: It is black above, with the exception of a moderately broad, bright yellow stripe running from the upper posterior corner of each eye, along the dorsum of the pronotum just above the lateral lobes and along the abdomen to the last dorsal segment. On the abdomen they are separated by a space of about the width of one of the bands, and are narrowly interrupted at the base of each segment. The black lateral band is much better defined than in the ♀, and on the abdomen is sharply separated from the bright yellow venter. The markings are in general more distinct and the colours brighter than in the female.

Length of body: ♂, 16 mm.—18.5 mm.; ♀, 22.5 mm.—23.5 mm.

Length of antennæ: ♂, 7 mm.—8 mm.; ♀, 5 mm.—8 mm.

Length of head and pronotum: ♂, 5 mm.—5.8 mm.; ♀, 6 mm.—7.5 mm.

Length of hind femora: ♂, 8.5 mm.—10 mm.; ♀, 10.5 mm.—11.3 mm.

The three specimens from Sandon were taken on the grassy path of a snowslide, at an elevation of about 2,600 feet, on September 16, 1897; while those from Mt Piron were captured on September 19, 1897, at about 7,000 feet, being above timber-line.

In the accompanying plate (A) is a lateral view of the ♀, (B) a dorsal view of the ♂, (C) and (D) are respectively lateral and dorsal views of the male abdominal appendages.

A NEW CYCHRINID.

BY THE REV. J. H. KEEN, MASSETT, QUEEN CHARLOTTE ISLANDS, B. C.

This fine plum-coloured beetle—superficially resembling *Cychnus marginatus*—was taken by me in 1896, and kindly named for me by Captain Casey, whose description of it, published in his Coleoptero-logical Notices, No. VII, page 334, I take the liberty of transcribing

below for the benefit of Canadian students who may not see Captain Casey's books. The beetle occurs sparingly, under loose bark or under logs on the ground, along the mainland of British Columbia from Fort Simpson to Rivers Inlet, and probably farther, if sought for. I have never met with a specimen on the Queen Charlotte Islands.

The following is Capt. Casey's description :

"*Brennus insularis*, n. sp.—Elongate, rather feebly ventricose, shining throughout, black throughout the body and legs, the elytra rather dusky cupreo-violaceous, with narrow and bright aeneous side margins. *Head* rather stout, moderately elongate, the vertex almost smooth, the broadly impressed transverse nuchal constriction rather pronounced; genæ feebly developed, with the angular notch small and inconspicuous; supra-orbital ridges moderately strong and inwardly inclined at the antennæ, fine posteriorly; antennæ slender, moderate in length, the basal joint distinctly thicker, claviform, not as long as the next two, the seta at apical eighth. *Prothorax* well developed, scarcely as long as wide, moderately dilated and broadly rounded throughout anteriorly, the sides not more strongly rounded before, but becoming gradually oblique behind; the middle, to the base, with a scarcely visible ante-basal situation; angles much more than right, and bluntly rounded; base wide, more than half the maximum width and fully as wide as the head; disk feebly convex, the median line strong; sublateral impressions deep, extending far before the middle; reflexed margins rather fine. *Elytra* elongate-elliptical, fully half longer than wide, nearly three and a half times as long as the prothorax and two and a third times as wide; humeri evenly and obliquely rounded; reflexed margins ample but rather finely punctate; disk strongly, evenly convex, the striæ deep and broadly impressed, rather uneven, obscurely punctate, readily traceable throughout the width, the intervals convex, much broken up toward the sides and finely so toward the apex. Legs very slender. Length 17.5 mm.; width 6.8 mm.

"Queen Charlotte Islands. [This is an error. See above.—J. H. K.]

"This fine species is founded upon a single perfect specimen recently sent to me by Mr. Fletcher and probably taken by Mr. Keen. It is a female, but the species will be readily known from *marginatus* by its much larger size, more elongate and convex elytra, larger and less posteriorly narrowed prothorax, with the sides less sinuate toward base, and several other characters."

NOTE ON THE DIURNALS.

BY A. RADCLIFFE GROTE, A. M., ROEMER MUSEUM, HILDESHEIM.

Mancipium brassicae.—Dr. Chapman writes me that certain specimens of this common species examined by him showed the very short veinlet III. 3 + 4. This veinlet constantly diminishes in size, progressing towards the tip of the wing to finally vanish, through many forms of the *Pieridæ*. I had indeed expected it to be occasionally persistent in *brassicae*, although my preparations did not show it. It has disappeared in *Pontia daplidice*, in *Nathalis iole*, and, strange to say, in that curious and now isolated Pierid, *Gonophlebia paradoxa*. This variability, in one and the same species, is interesting because it follows the general evolutionary direction of the changes in the venation. Always the radial branches in the Pierids and other groups tend to diminish in number. Always the disintegration of the Media advances, until it finally disappears, as a system, from the surface of the wing (*Rothschildia*, *Samia*, *Potamis*, etc.). A parallel case to that of *brassicae* is offered by *Copismerinthus ocellata*. In some specimens of this Hawk Moth, vein IV, is still thrown off from the cross vein of the hind wings, instead of the Radius, which it has usually ascended to beyond the cell. We must regard these as instances of generalization in the individual, of a reversion to what was formerly the rule and is now becoming, by slow degrees, the exception. Mr. Scudder kindly informed me that he believed that slight structural differences in all stages of *brassicae* could be demonstrated as compared with the type of *Pieris*. In my studies I am mainly concerned with the correct use of generic names extant in literature, without attempting to judge of the comparative value of such differences; if any characters can be found I take them as generic if a title exists in literature. We may reasonably regard *Mancipium* as a development of *Pieris* since it shows a further progress upon the same structural lines. I have tried to show that *Pontia* presents a parallel advance, but upon a distinct phylogenetic terminal line, belonging to the *Anthocharini* and not to *Pieris* as heretofore classified. The five-branched Radius of *Euchloe stella* has been reduced to four in *Tetracharis cethura*, to three in *Pontia daplidice*, which retains the Anthocharid pattern and shape of wing.

Eumargareta coresia.—I have recently studied this South American Nymphalid, which belongs taxonomically to the *Nymphalinae*, but differs by position of the last radial branches, and can hardly be a member of the phylogenetic group to which *Limenitis* and *Nymphalis lucilla*

belong, and which embraces also *Basilarchia*. Mr. W. F. Kirby writes me that he cannot find that any new name has been proposed for *Megalura*, Blanchard, 1840, preoccupied by Horsfield, 1820, and Agassiz, 1833. (See Scudder, Historical Sketch, 212.) I have accordingly proposed the above generic title for the type *coresia*. What is relatively unimportant at the present time seems to be a discussion of rules limiting the application of the law of priority, all of which are arbitrary in their nature and cannot compel universal consent. What appears to me of greater practical value is the fixing of the types of existing generic titles, so that the use of these by themselves, without mention of any species, may be intelligible. The discord is already such that much of what has been recently written by the systematists on the Diurnals cannot be followed or clearly understood.

Issoria lathonia.—This is a distinct genus from *Argynnis aglaia*, in which type vein III₁ is appressed upon the Radius to a point beyond the cell, while really arising at a point within the cell. In *Issoria* this appression, which prepares us for the point of emission of vein III₁ in *Melitæa*, has not taken place. In *Issoria*, vein III₁ is brought nearer than in *Brenthis hecate*. These two types, *Issoria* and *Brenthis*, appear more generalized than *Argynnis*. Both in *Dryas paphia* and in *Acidalia niphe* the appression has taken place as in *Argynnis*, and I am at a loss to distinguish the genera from the neururation. In the more specialized *Agraulis* all the branches arise beyond the cell. With the lengthening of the wing the radial veins tend to arise beyond the cell and reproduce the character found in *Leptidia* and other "long-wings." In *Dione iuno*, vein III₁ has not progressed so far beyond the cell as in *Agraulis vanillæ*. In *Euptoieta claudia*, vein III₁ has not reached the extremity of the cell; the cross vein is nearly vanished on hind wings between IV₁ and cubitus, a specialization in the direction of *Melitæa*. In *Euphydryas phaeton* the only deviation from the *Melitæa* type is the very slightly more strongly retained cross vein on primaries. This is hardly noticeable, and I am at a loss to distinguish the genus by the neururation from *Melitæa maturna*. I can also not distinguish *Cinclidia*. The genera *Acidalia*, *Dryas*, *Euphydryas* and *Cinclidia* do not afford neurational characters by which they may be distinguished, the two first from *Argynnis*, the two latter from *Melitæa*. In *Phyciodes tharos*, vein III₁ springs from Radius before extremity of cell; vein III₁, as in *Melitæa*; vein III₄ decidedly to apex of wing, as frequently

occurs in the group of *Argynnini*. It has the *Melitæa* specialized character of the open cell on secondaries, but in the type of *Melitæa* vein III₄ does not attain apex of wing, but falls below it. The *Melitæini* are more specialized as a group than the *Argynnini*. This latter seems on the whole the generalized group of the *Nymphalide* proper, and from the ancestors which the modern Fritillaries represent may have sprung the holarctic *Argynninae*, and from these the *Nymphalinae*. But the latter are, perhaps, not monophyletic; at least the West South American *Eumargaræta* excites doubts which do not arise from a study of the South American genus *Adelpha*, which latter, no doubt, belongs phylogenetically with the Old World *Athyma*, although the pattern differs. The definition of the *Nymphalinae* by the taxonomic character of the coalescence of veins II. and III. of the hind wings up to the point of the almost stationary 1 (the "präcostal spur" of some writers) probably throws together butterflies which have reached this specialization by different routes.

Morphinae — My study of *Morpho* leads me to believe that the group has sprung from the Satyrid stem. It has attained the grade of specialization of *Melitæa*, the cell on hind wings open. It would seem that these butterflies are specialized *Agapetide*, which have assumed the habit of a more lofty flight. As a rule, the "tree" butterflies and moths seem more specialized, and have probably everywhere appeared later upon the scene.

CONCERNING XANTHORHOE GLACIALIS, HULST.

Dr. Hulst describes the species and *X. longula* in May CAN. ENT., p. 119. The National Museum has a long series of these (225 specimens), very variable, but doubtless representing only a single species. In spite of the label, I am of the opinion that Dr. Hulst's types are not American specimens. Some bear a printed label "Alaska" and "Coll. C. V. Riley"; others have a written label "Behring Island, Alaska"; and others "Behring Island." I think the whole series were collected by Dr. Stejneger at Behring Island, which is one of the Commander Islands off the coast of Kamchatka, and has in general an Asiatic fauna. It is unfortunate that these seductive little "Alaska" labels were used on the specimens. However, the species is evidently American if the type specimens are not, for we have one labelled "Aleutian Islands, Turner, 1881," and another that I take to be the same (a ♀, and rubbed), from "Nushagak River, Alaska, Aug. 14, 1881, McKay collector."

HARRISON G. DYAR.

DEIDAMIA INSCRIPTA, HARR.

In the early part of May last, on meeting Mr. Bice he had the agreeable information to convey to me that he had taken a Sphinx that was new to him. Upon looking at it I at once suspected that it was new to me also; and on investigation proved the correctness of the impression. Its small size, strikingly Smerinthoid form of primaries, peculiar olive-gray colour and distinctly outlined ornamentation made it easy to determine.

Prof. Fernald gives, in his "Sphingidæ of New England," the following brief, but clear and unmistakable, description of the species :

"Expanse of wings, two inches. The head and thorax are grayish-brown, with a double, curved, white line, edged with brown across the prothorax, behind which are two other curved lines, one on the middle and the other on the hinder part of the thorax. The abdomen is ashy, and has two rows of dark brown spots. The fore wings are ashy-gray at base, in the middle and toward the apex. Three brownish bands cross the wings before the middle, another angulated band crosses beyond the end of the cell, and the outer border of the wing has two dark brown lunules on the margin below the apex, before the second of which is a third spot, with more or less white between. The discal spot is paler than the ground colour of the wing. The hind wings are of a dull reddish-brown colour, with a dusky terminal band, which grows narrow toward the anal angle. Fringes white. The mature larva is two inches long, of a fine green colour, and the body tapers from the third segment toward the head. The caudal horn is whitish at the tip. They go into the ground (not very deep), and transform into very dark brown pupæ, with the tongue-case a short elevated ridge; a short central spine at the end of the head and a spinous tubercle on each of the eye-cases. Feeds on the leaves of grape and Virginia creeper."

Mr. Grote says: "No known Smerinthoid feeds on the grape." He gives the habitat as "Canada to Virginia." To which Dr. J. B. Smith adds, "Westward to the Mississippi Valley." He also says, "The species is by no means common." It is figured in Strecker's Lep. Rho. et. Het., Plate XIII., Fig. 8.

This is the fourth Sphingid species that Mr. Bice has secured new to the Society's collection.

J. ALSTON MOFFAT, London, Ont.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

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(Paper No. 3.)

FAMILY V.—XYELIDÆ.

No species seems to be known in this family outside of the European and North American faunas, and very few species are described. The group was first treated as a subfamily by Newman as early as 1834.

The imagoes appear very early in the year, or in February, March and April, deposit their eggs and then disappear, the consequence being that very few are taken and only a few of the commoner forms are known. With more careful collecting early in the season, however, the probabilities are that many more species will be discovered in our fauna.

The imagoes of three distinct species of these insects, representing as many genera, have been bred recently from the larvæ by Dr. H. G. Dyar, and we are not only indebted to him for the first authentic life-history of a species in this group, but also for the first scientific description of the larva. His recent discovery of a large undescribed species in the rare genus *Pleuroneura* was most unexpected.

The known genera seem to fall into two well-marked natural groups, distinguished by differences in both the front and hind wings, and which are here treated as subfamilies.

Table of Subfamilies.

Front wings with the intercostal vein separated, not uniting with the subcostal; hind wings with two complete submarginal cells and one discoidal cell; ovipositor hardly half the length of the abdomen. Subfamily I., Macroxyelinæ.

Front wings with the intercostal vein uniting with the subcostal; hind wings with one complete submarginal and one discoidal cell; ovipositor as long or longer than the abdomen. . . . Subfamily II., Xyelinae.

Subfamily I.—MACROXYELINÆ.

The imagoes of this group are very much larger than those in the *Xyelinae*, and are readily distinguished by the distinctly separated intercostal vein, as in the *Lydinae*, and their much shorter ovipositor, while their larvæ seem to be strictly external feeders.

The genera now known may be separated as follows :

Table of Genera.

- Antennæ 10-12 jointed.....2.
 Antennæ 9-jointed, the six terminal joints very short, together not longer than the scape and less than half the length of the third joint; clypeus with a median emargination; claws with an erect tooth before tip.....*Macroxyela*, Kirby.
 2. Clypeus anteriorly triangularly produced at the middle; all tibiæ very spinous, the hind tibiæ with four lateral spurs beneath.
 Claws cleft; antennæ 10-11 jointed (the tenth sometimes divided into two joints), the seven or eight terminal joints very short, together not longer than the scape or less than one-fourth the length of the third joint; only one transverse radial nervure joining the second cubital cell. *Megaxyela*, Ashm.
 Claws with a large erect tooth before the middle; antennæ 12-jointed, the nine terminal joints much shortened, together much shorter than the third joint; both transverse radial nervures joining the second cubital cell. *Pleuroneura*, Konow.

Subfamily II.—XYELINÆ.

The species at present known in this group are very small and are readily distinguished by having the intercostal vein united with the subcostal, by having only one complete submarginal cell in the hind wings, and by the longer ovipositor. Their larvæ are apparently internal feeders.

Only two genera are known, separated as follows :

Table of Genera.

- Antennæ 12-jointed, the nine terminal joints slender, lengthened, together as long or longer than the third joint; claws long, slender, with a very minute, nearly obsolete, tooth beneath, a little beyond the middle.
 Front wings with both transverse radial nervures received by the second cubital cell, rarely with the second transverse radius interstitial; clypeus with a median ridge, which is slightly extended beyond the anterior margin, but scarcely triangularly produced.....*Manoxyela*, Ashm.
 Front wings with the first transverse radial nervure received by the second cubital cell, the second transverse radius received by the third cubital cell; clypeus anteriorly triangularly produced medially.....*Xyela*, Dalman.

FAMILY VI., LYDIDÆ.

The genera in this family have been revised recently by Mr. F. W. Konow,* who treats the group as a tribe, dividing it into two subtribes, (1) *Megalodontides* and (2) *Lydides*. He recognizes eight genera, but some of these he again divides into subgenera.

Believing that these insects represent a distinct family, I have here recognized his subtribes as subfamilies, and his subgenera as genera.

In my table of families I overlooked the fact that the *Megalodontides* (exotic species) had no distinct intercostal vein, so that line 2, page 144, should be amended to read: Costal cell most frequently with an intercostal cell.

The following tables are based mainly upon those of Konow's, although I have made some changes, and used some characters not mentioned by him, which, it is believed, will render the genera much more readily distinguishable. All of them are known to me, except *Melanopus* and *Tristactus*.

Table of Subfamilies.

Head usually without the two longitudinal grooved lines on the vertex, or with only traces of them; antennæ with the middle joints depressed or concave beneath, with more or less distinct branches or processes; front wings without an intercostal vein, or it is only indicated by a streak; cubitus originating from the middle of the basal nervure; second dorsal segment of abdomen entire, without a median slit.....Subfamily I., *Megalodontinæ*.

Head always with two distinct longitudinally grooved lines on vertex; antennæ filiform, simple; front wings with an intercostal vein; cubitus originating from the apex† of the basal nervure or from the costal vein; second dorsal segment of abdomen emarginate or with a median slit.....Subfamily II., *Lydinæ*.

Subfamily I.—MEGALODONTINÆ.

This group or subfamily, so far as I know, has no representative in our fauna. It is more particularly confined to the Asiatic fauna, a few species only being found in Europe, while but a single species has been recorded from Africa.

*Annalen des K. K. Naturh. Hofm., XII., 1897, Heft I.

†Konow says from the *base*, but in this he is in error, since the basal nervure in reality represents a fork of the median vein and originates from that vein and not from the subcostal vein, as his language would seem to imply.

It is quite probable, however, that species will yet be discovered in our fauna, especially in the unexplored regions of Alaska and British Columbia.

The four genera recognized by Konow may be distinguished by the aid of the following table :

Table of Genera.

Flagellum with joints 2-13 of an unequal length, gradually decreasing in length, the middle joints without long, compressed, subfoliaceous processes. 2.

Flagellum with joints 2-13 of an equal length, or nearly so, the middle joints with long, compressed, subfoliaceous processes or branches.

Process of the first flagellar joint at least as long as the two following joints united, or longer; penultimate antennal joint longer than the second. *Rhipidioceros*, Konow.

Process of the first flagellar joint shorter than the two following joints united, usually shorter than the second joint; penultimate antennal joint shorter than the second. *Megalodontes*, Latreille.

2. Antennæ at least 20-jointed; joints 4-9 in ♀, 3-13 in ♂, at apex obliquely truncate and somewhat produced, but with each process compactly united with the following; the penultimate joint of labial palpi shortened, triangular. *Melanopus*, Konow.

Antennæ 13-14-jointed; joints from fourth and beyond triangular, almost truncate at apex; penultimate joint of maxillary and labial palpi triangular, much shorter than the last. . . . *Tristactus*, Konow.

Subfamily II.—LYDINÆ.

This subfamily is at once distinguished from the *Megalodontinæ* by always having two parallel, deeply impressed lines on the vertex, and by the distinct intercostal vein in the front wings.

All of our species, so far discovered, belong in this subfamily, and all of the genera, tabulated below, occur in our fauna, except *Caenolyta* and *Gongylocorisa*.

The genera may be easily distinguished by the aid of the following table :

Table of Genera.

Claws cleft. 3.

Claws not cleft, but with a small median or subapical tooth.

Anterior tibiæ without a lateral spur before apex. 2.

Anterior tibiæ with a lateral spur before apex.

Temples immargined; second transverse cubitus interstitial with the transverse radius..... *Lyda*, Fabr.

Temples, at least below, sharply margined.. *Itycorsia*, Konow.

2. Basal nervure uniting with the cubitus near its base; second transverse cubitus interstitial with the transverse radius or joining the radius a little *beyond* it *Cephaleia*, Panzer.

Basal nervure uniting with the subcostal vein in the angle formed by the cubitus; second transverse cubitus uniting with the radius *before* the transverse radius *Cænolyda*, Konow.

3. Intercostal vein forked at apex, the outer branch attaining the costal vein, the inner branch joining the subcostal vein and thus forming two closed basal cells.....4.

Intercostal vein with only the outer branch of the fork, therefore only one closed basal cell; basal nervure joining the cubitus near its middle.

Temples posteriorly rounded; transverse median nervure present; third antennal joint very long, as long as joints 4-9 or 10 united..... *Gongylocorisa*, Konow.

Temples posteriorly sharply margined; transverse median nervure absent; third antennal joint not or scarcely longer than joints 4-6 united..... *Neurotoma*, Konow.

4. Basal nervure joining the cubitus near its base....5.
Basal nervure joining the subcostal vein at the origin of the cubitus or in the angle formed by it; first joint of flagellum scarcely as long as joints 2-3 united; temples acutely margined..... *Kelidoptera*, Konow.

5. First joint of flagellum not or scarcely longer than the second, or at least always much shorter than joints 2-3 united; temples margined..... *Pamphilus*, Latreille.

First joint of flagellum as long or longer than joints 2 3 united; area of vertex always longer than wide.

Head punctate, the temples margined; second transverse median nervure always received by the first discoidal cell *beyond* its middle..... *Bactroceros*, Konow.

Head polished, impunctate, the temples rounded behind, immargined; second transverse median nervure received by the first discoidal cell *at* or *before* the middle *Liolyda*, Ashm, n. g.

(Type *L. frontalis*, Westw.)

FAMILY VII.—HYLOTOMINÆ.

All the species belonging in this group or subfamily have always 3-jointed antennæ, the third joint in the female being simple, while in the male it is most frequently forked. Sometimes it is simple in the male as in the female, but in this case, however, it is as a rule more pointed at apex and more densely pubescent.

The 3-jointed antennæ readily distinguish the family, and must always be depended upon, since otherwise it approaches, in its thoracic and abdominal characters, very close to the *Lophyridæ*, *Perreyiidae* and the *Selandriidae*.

Since formulating my table for distinguishing the families I have discovered a new genus without an anal cell.

The family may be divided into two subfamilies as follows :

Table of Subfamilies.

Front wings without a transverse nervure in the costal cell.....	Subfamily I., Schizocerinæ.
Front wings with a transverse nervure in costal cell.....	Subfamily II., Hylotominæ.

Subfamily I.—SCHIZOCERINÆ.

This subfamily is readily distinguished by the absence of a costal transverse nervure. It comprises by far the greater number of genera and species, and is widely distributed throughout the globe, the species found in the tropics being especially handsome.

The numerous genera may be easily recognized by the aid of the following table :

Table of Genera.

Marginal cell appendiculate.....	6.
Marginal cell not appendiculate.	
Front wings with three submarginal cells.....	5.
Front wings with four submarginal cells (rarely with the first transverse cubitus subobsolete).....	2.
2. Lanceolate cell petiolate, the small cell at base obliterated by the short anal vein uniting with the median.....	3.
Lanceolate cell longly contracted, nearly petiolate, but always with a small closed cell at base.	
Second submarginal cell receiving both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus..	4.

Second and third submarginal cells each receiving a recurrent nervure.

Head seen from in front usually much broader than long; ♀ antennæ slender filiform, ♂ furcate.

Hind wings without an anal cell. *Sericocera*, Brullé.

Hind wings with an anal cell. . . *Schizocera*, Latreille.

Head seen from in front not or scarcely broader than long; second submarginal cell along the radius not longer than the third; hind wings with two discal cells;

♀ antennæ subclavate, ♂ furcate. . . *Cyphona*, Dahlbom.

3. Second submarginal cell much longer than the third, the latter quadrate; ♀ antennæ filiform, ♂ furcate. . . . *Schizocera*, Latreille.

4. Second submarginal cell receiving the first recurrent, the second recurrent interstitial with the second transverse cubitus; middle and hind tibiæ with a lateral spur. *Scorbina*, Lepel.

4. Second submarginal cell receiving both recurrent nervures; middle and hind tibiæ without lateral spurs; hind wings with two discal cells; mandibles simple. *Pseudocyphona*, Ashm.,* n. g.

5. First submarginal cell receiving both recurrent nervures. *Themos*, Norton.

First and second submarginal cells each receiving a recurrent nervure. *Schizocera*, Latr.

= *Atomocera*, Say.

= *Sphecophilus*, Prov.

6. Front wings with four submarginal cells; if with three, which occurs only in a single genus in the ♂, the second transverse nervure wanting. 9.

Front wings with three submarginal cells, the first transverse cubitus wanting.

First and second submarginal cell each receiving a recurrent nervure. 7.

First submarginal cell receiving both recurrent nervures; hind wings with two discal cells, the first (in reality the first submarginal) about twice as long as the second. . . *Dioloceris*, Curtis.

Second submarginal cell receiving both recurrent nervures. *Topotrita*, Kirby.

7. Middle and hind tibiæ with a lateral spur. 8.

* Type *P. Mexicana*.

Middle and hind tibiae without a lateral spur; hind wings with two discal cells, the first much larger than the second.

Hind wings with a lanceolate cell *Ptilia*, Lepel.
(= *Didymia*, Lep.)

Hind wings without a lanceolate cell *Gymnia*, Spinola.

8. Hind wings with two discal cells, the first much smaller than the second, the anal cell present *Trichorhachus*, Kirby.

9. Second submarginal cell receiving two recurrent nervures, or the second recurrent is interstitial 11.

Second and third submarginal cell each receiving a recurrent nervure; hind wings with two discal cells.

Hind and middle tibiae with lateral spurs 10.

Hind tibiae without lateral spurs.

Third submarginal cell much shorter than the second; hind wings without an anal cell *Hemidianura*, Kirby.

Third submarginal cell as long as the second or nearly so; hind wings with an anal cell *Athermantus*, Kirby.

10. Third submarginal cell shorter than the second; hind wings with an anal cell *Caloptilia*, Ashm., n. g.
(Type *C. Townsendi*, Ashm.)

11. Hind tibiae with apical spurs 12.

Hind tibiae without apical spurs.

Head large, quadrate, the temples full and very broad; mandibles acute at tip; tarsal joints very short, joints 2-5 transverse *Pachylota*, Westwood.

12. Second submarginal cell receiving both recurrent nervures; middle and hind tibiae without lateral spurs 13.

Second submarginal cell receiving only one recurrent nervure, the second recurrent interstitial.

Middle and hind tibiae with a lateral spur; third submarginal cell much larger than the first and much broader at apex than the second *Acanthoptenos*, Ashm., n. g.
(*A. Weithii*, Ashm.)

13. First and third submarginal cells rather small, subequal, the second elongate, the third quadrate or nearly so.

Claws simple *Ptenos*, Norton.

Claws bifid *Nematoneura*, André.

Third submarginal cell along the radius as long as the second, along the cubitus only half its length, the third transverse cubitus strongly curving outward and then upward; marginal cell broadly truncate at apex, so that with the long appendage it appears almost two-celled; hind wings with two discal cells, the second only about half the length of the first; claws cleft. ♂ with only three submarginal cells, the transverse cubitus entirely wanting, antennæ furcate.....*Neoptilia*, Ashm., n. g.
(Type *N. mexicana*, Ashm.)

Subfamily II.—HYLOTOMINÆ.

This group closely resembles the former, but the presence of a short transverse nervure in the costal cell readily distinguishes it. It is a character common in the families which are to follow, and its position and shape or direction appears to be of great taxonomic value.

The genera recognized may be separated as follows:

Table of Genera.

- | | |
|--|----|
| Marginal cell appendiculate | 3. |
| Marginal cell not appendiculate | 2. |
| 2. Front wings with three submarginal cells, the first and second each receiving a recurrent nervure; middle and hind tibiæ without a lateral spur; third antennal joint in ♂ furcate... <i>Micarge</i> , Ashm., n. g.
(Type <i>A. ruficollis</i> , Nat.) | |
| 3. Cubitus originating from the apex of the basal nervure or in the angle formed by it and the subcostal vein.....4. | |
| Cubitus originating from the subcostal vein more or less remote from the apex of the basal nervure. | |
| Front wings with four submarginal cells, the second and third each receiving a recurrent nervure..... <i>Hylotoma</i> , Latreille.
(Section I.) | |
| 4. Front wings with four submarginal cells, the second and third each receiving a recurrent nervure. | |
| Hind wings with a lanceolate cell; middle and hind tibiæ with a lateral spur..... <i>Hylotoma</i> , Latreille.
(Section II.) | |
| Hind wings without a lanceolate cell; middle and hind tibiæ without a lateral spur..... <i>Gymniopterus</i> , Ashm., n. g.
(Type <i>G. singularis</i> , Ashm.) | |

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE
GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, N. Y.

(Continued from page 195.)

SELIDOSEMA NIGRESCENS, n. sp

Expands 31-33 mm. Palpi and front dark fuscous; antennæ black above, fuscous below; thorax dark fuscous, patagiæ lighter; abdomen dark even fuscous. All wings dark fuscous, made by heavy coalescing striations of fuscous and blackish on a light fuscous ground; basal line black, quite distinct, rounded, wavy; a median shade passing through distinct black discal spot; an outer black distinct cross line, continued across hind wing, on fore wing sinuous, subparallel with outer margin, on hind wing nearly or quite straight; on fore wing beyond this line is a broad reddish-brown band, not always clear, however, sometimes showing faintly at middle of hind wing; a submarginal row of light, not distinct, lunules, edged within with darker; marginal lines black, distinct. Beneath fuscous, with faint line shadows, and a dark shadow spot near apex of fore wings.

San Antonio, Texas. The generic reference is provisional, as all the specimens before me are females.

CONIODES PLUMIGERARIA, Hulst.

This insect was described from the ♂ only as *Boarmia plumigeraria*, Ento. Am. III., 216, 1887. In Bull. No. 7, new series, U. S. Dept. Agric., p. 64, 1897, Mr. Coquillett publishes a life-history of the insect, and gives us the information, apart from larval history, that the female is wingless. I have received a specimen of the ♀ from the National Museum collection, which I herewith describe.

Palpi short, rather light, separate, black or blackish-gray; front broad, black with a few gray scales; tongue very short, weak; thorax blackish-gray, short, rather stout; abdomen blackish-gray, very short and heavy; antennæ filiform, blackish-gray, loosely scaled; wings undeveloped, about as long as the thorax, blackish-gray, though lighter than thorax and abdomen; legs blackish-gray, rather long, slender, hind tibiae with two pairs of spurs; the abdomen is armed with chitinous spines, not very stout, quite numerous over the whole segment, but hidden in the covering scales. Upon closely examining the male I find that it also has the abdomen armed with spines as in the female.

The insect, by the wingless female and as well the abdominal armature, is allied very closely to the genera of the *Phigalia* group. The genus *Coniodes* is, however, sufficiently distinct from *Rhaphidodemas* in the almost obsolete tongue and the male antennæ pectinated to the tip.

PHENGOMMATÆA DISSIMILIS, n. sp.

Expands 33 mm. Palpi and front white; thorax and abdomen white; all wings above and below of an even, smooth cream white, the fore wings above being of a somewhat deeper shade.

Glenwood Springs, Colo.; from Dr. Barnes.

RIPULA VESTALIS, n. sp.

Expands 40-42 mm. Palpi whitish below, black above; front black, or white below, black above, thorax, abdomen and all wings, above and below, pure, unbroken, silky white; antennæ fuscous, fore and middle legs black at end of femora, otherwise pure white, except some black on tibial epiphysis of fore legs.

South Florida; from Mrs. A. T. Slosson.

THERINA PUNCTATA, n. sp.

Expands 42 mm. Palpi very short, fuscous; front fuscous ochre, bright reddish ochre at summit; thorax, and abdomen light fuscous ochre; fore wings ochre, with fuscous striations, veins with an orange-ochre shade; inner line of blackish points, not distinct; outer line of black points, with an outer orange shading, sinuous, subparallel with outer margin; discal spot faint; hind wings ochre, with faint cross line; beneath even ochre yellow with fuscous tinge, lines and spots obsolete.

Glenwood Springs, Colorado; from Dr. Barnes. Near *T. vitrina*, Grt., but much larger, wings more extended, much more thickly scaled, and outer line much more sinuous.

NEOTERPES EPHELIDARIA, var. *Kunzei*, n. var.

I have received from Dr. Kunzé a number of specimens of *N. ephelidaria*, Hulst, in which the whitish colour of the fore wings is replaced with yellow, varying somewhat in brightness. The specimens vary also in the lines, in the most these being quite evident as in *N. ephelidaria*, but in some specimens they are almost obsolete. In one case the fore wings approach *N. Edwardsata*, Pack., in appearance in some of its lighter marked forms. It may, therefore, be a variety connecting the two species.

EUGONOBAPTA CONSTANS, n. sp.

Expands 32 mm. Palpi fuscous, tipped with white; front gray; thorax and abdomen clay colour, the latter more ochreous; fore wings broad, falcate, angulate at vein 4, dull clay colour, more or less stained and striated with fuscous, this darkening into a rounded indeterminate basal band, and a better marked, though still indefinite, outer band running nearly to apex; margin ochre-clay colour; hind wings strongly angled at vein 4, of the same colour as fore wings, outer band continued from and like that of fore wings, and a faint submarginal shading; discal spots on all wings of dark points; beneath as above, the colours sharper, and the lines somewhat more determinate.

Prescott, Ariz.; from Dr. Kunzé; taken Aug., 1896.

EUGONOBAPTA OCHREATA, n. sp.

Expands 33 mm. Size and shape of *E. constans*, Hulst. Colour bright ochre, clear and even; inner line reddish-ochre, faint; outer line reddish-ochre, fine, subparallel with margin; beyond outer line a row of blackish blotches; hind wings colour of fore wings, outer line the same, nearly straight, and at middle of wings, with two or three blackish blotches beyond towards inner margin; beneath bright ochre, outer line scarcely showing, the blotches obsolete.

Senator, Ariz.; from Dr. Kunzé; taken Aug. 20, 1896.

SLOSSONIA, n. gen.

Palpi long, extended, beaklike; tongue very short, weak; front tufted; antennæ bipectinate in ♂, apex simple, serrate in ♀; thorax and abdomen untufted; fore tibiæ unarmed; hind tibiæ swollen, without hair pencil, with two pairs of spurs; fore wings angulate in ♂, rounded and subfalcate in ♀, without fovea below in ♂; 12 veins: 3 and 4 separate, 5 near middle of cell; 6 separate from 7; 10 and 11 from cell separate from 9 and 12; hind wings, 5 obsolete, 6 and 7 separate, 8 separate from cell. Type *S. rubrotincta*, Hulst.

The ♀ of the type is wanting; the determination of the ♀ is from *S. latipennis*, Hulst, which, as the ♂ is not known, may not belong here.

This generic name is with very great pleasure given in honour of Mrs. Annie Trumbull Slosson, of New York, who has not only added very greatly to our knowledge of the American insect world, especially of Southern Florida and the White Mountains of New Hampshire, but has herself also done some excellent descriptive and critical work. To this I

may add my appreciation of her charming personality, of her high standing as an author in the literary world, and of her very large generosity in favours which are personal to myself.

SLOSSONIA RUBROINCTA, n. sp.

Expands 30 mm. Palpi bright ochreous, tinged on sides by reddish-purple; front ochreous; antennæ ochreous, tinged at base above with reddish-purple; thorax and abdomen light clear ochre. Fore wings broad, angled on outer margin at vein 4, clear light ochre with purple-red stain at base, on costa, and two purple-red costal stains marking the beginning of otherwise obsolete cross lines; apex more yellow. Hind wings angulate at vein 4, broad, light clear ochre; discal spots and marginal lines obsolete. Beneath in colour as above, the hind wings sparsely dotted in the blackish scales, thickening to a diffuse black spot along inner margin. All legs ochre, stained especially on tibiæ with purple-red.

Los Angeles Co., Cal.; taken in July; type in National Museum, No. 3943.

SLOSSONIA LATIPENNIS, n. sp.

Expands 33 mm. Palpi long, slender, ochreous, tipped with black; front ochre; thorax yellowish; abdomen ochre-white; fore wings broad, even, rounded, ochreous, stained with yellow at base, a faint edging of blackish basally on costa, and a faint indication of a straight oblique whitish line beginning at costa close to apex. Hind wings ochreous, a little yellow stained on middle portion, with a faint, somewhat rounded line as on fore wings; discal spots fine, jet black; all wings very broad, the hind wings with especially long inner margin and distinct posterior angle. Beneath all wings light ochreous, the fore wings somewhat yellow at base and apex, discal spots black, some black scales on hind wings between discal spot and inner margin; legs as far as seen whitish-ochreous, with tibiæ stained with black.

Cocoanut Grove, S. Fla. Type in National Museum, No. 3956.

SYNAXIS FUSCATA, n. sp.

Expands 48 mm. Palpi dark fuscous; front whitish; thorax ochreous fuscous; abdomen fuscous; fore wings dirty fuscous, between the cross lines darker, forming a cross band; discal spots black; hind wings fuscous except along fore margin; cross line broad, not strongly marked, reaching from inner margin half across wings, discal spots black.

Beneath lighter fuscous, more even, the hind wings more loosely striated, and all with more of an ochreous tinge.

Glenmore Springs, Colorado; from Dr. Barnes; taken between Sept. 16 and 23.

ENNOMOS OCHREATUS, n. sp.

Of the size and shape of *E. magnarius*, Guen., but of an even bright ochre colour, scarcely darkening into darker ochre along outer margin and faintly on outer line, the colour being almost exactly the same below. This may be an extreme variety of *E. magnarius*, of which I have received a number of specimens from Colorado and Utah, but all these, though lighter than the Eastern form, have the lines distinct and the colours deeper and are quite uniform.

Colorado; from Dr. Gillette.

METANEMA SUBPUNCTATA, n. sp.

Expands 32 mm. An insect of the size and shape of *M. excelsa*, Streck., with the ground colour of fore wings white, heavily overlaid with fuscous striations, which have a violet tinge; lines as in *M. excelsa*, edged with fuscous, the basal on the outside, the outer on the inside; outer margin brownish; hind wings stained whitish. Beneath in colour much as above, the fore wings less striated; the hind wings much more.

California.

MARMAREA PEPLARIOIDES, n. sp.

Expands 43 mm. An insect comparing with *M. occidentalis*, Hulst, much as *Azelina peplaria*, Hub., compares with *A. hubnerata*, Gn. The general colour is a bright bluish-mouse colour, the base darker, the middle field a broad bluish-black band; discal spot white; outer line of hind wings whitish with an inner edging of blackish. Beneath bluish, the hind wings much striated. It may be, and indeed probably is, a variety of *M. occidentalis*, though decidedly different in appearance.

San Francisco Mts., Ariz.; from Dr. Kunzé; taken July 23rd, 1897.

STENASPILATES INVIOLOATA, n. sp.

Of the size and general appearance of *S. radiosaria*, Hulst, but the colour is pure white, overlaid with an even light fuscous tinge. The basal line is wanting, the outer line is white, edged within with fuscous, nearly straight, and on all wings. Hind wings white at base, fuscous tinged outwardly; abdomen clay white; beneath as above.

Phoenix, Ariz., May 30th; from Dr. Kunzé. Very much lighter in colour than *S. radiosaria*, and differing in the ground colour entirely.

CABERODES MINIMA, n. sp.

Expands 28 mm. Palpi white, with a few scattered black scales intermixed; front white, tinged with fuscous; antennæ fuscous; thorax and abdomen light fuscous, the abdomen with some black scales; fore wings light fuscous ochre, with scattered blackish scales and striations; basal cross line rounded, not prominent; outer cross line heavy, black, nearly parallel with outer margin, a little emphasized on the veins; a slight costal spot near apex; discal spot large, prominent, black, with a slight central ochre point; hind wings white, faintly fuscous stained, with scattered fuscous scales, outer line broad, dark, parallel with outer margin; discal spot apparent, but not prominent. Beneath of the ground colour above, with outer lines and discal spots of all wings present but faint.

Arizona; quite different in appearance from the ordinary *Caberodes*.

NOTES ON CHLOROTETTIX, WITH SOME NEW SPECIES.

BY C. F. BAKER, AUBURN, ALA.

Chlorotettix unicolor, Fitch.—An examination of the Fitch type in the National Museum shows this to be the form described by Mr. Van Duzee as *galbanata*. As this will leave Mr. Van Duzee's *unicolor* without a name, it may be known as *Vanduzei*. *Vanduzei* differs from all the other described species in a character not before noted,—the ocelli are distant from the eyes,—while in all the others they are about as near as their own width or nearer. Differing thus widely from other species referred here, *Vanduzei* must still remain the type of the genus, which should perhaps be used for it alone. The male of *unicolor*, Fh., closely resembles in genital characters that of *spatulatus* which I have from Kansas and Texas.

Chlorotettix emarginata, n. sp.

Length, 6.25-6.5 mm. Vertex blunter than in *unicolor*; colour the same. Valve in male triangular and about the length of preceding segment. Plates about equalling pygofers, rounded at tips, but little wider towards the base, where each plate is suddenly depressed, giving the whole the appearance, as viewed from below, of being strongly constricted. Last ventral segment of female with lateral angles strongly produced backwards on either side of a broad, deep, rectangular emargination, the bottom of which is sinuate. Ovipositor equalling pygofers. Ocelli approximating eyes.

Described from two males and one female collected at Medellin, State of Vera Cruz, Mexico, by Rev. H. Th. Heyde. Resembles

unicolor, Fh. (= *galbanata*, Van D.), but is slightly larger and differs widely in the form of the genitalia, both male and female.

Chlorotettix breviceps, n. sp.

Length, 6.25 mm. Vertex not longer at middle than at eyes. Ocelli black, scarcely further than their width from the eyes. Colour throughout pale brownish; two longitudinal whitish lines on scutel. Last ventral segment twice the length of preceding, hind margin very broadly, slightly notched. Ovipositor about equalling pygofer.

Described from two females in the Herbert H. Smith collection, taken at Chapada, Brazil, in May. Nearest *viridia*, but the vertex shorter, the ocelli smaller and further from the eyes, and the colour different. This insect has somewhat the aspect of an *Idiocerus*.

Chlorotettix minima, n. sp.

Length, 5 mm. or slightly more or less. Ocelli large and very close to the eyes. Vertex distinctly, though but little, longer at middle than at eyes. Colour pale yellowish. Last ventral segment of female twice the length of preceding, lateral angles broadly rounded; medially with a deep narrow notch, extending more than half the length; the angles on either side of the summit of the notch projecting obliquely towards each other and sometimes nearly touching; in one specimen these projecting angles are nearly obsolete. Valve of male shorter than preceding segment and scarcely angled at middle. Plates rounded basally at sides, beyond middle becoming suddenly narrow and parallel-sided for rest of length.

Described from one male and several females in the Herbert H. Smith collection, taken at Chapada, Brazil, in April and May. The smallest species of the genus yet described. The form of the ventral notch varies, as it does in most species of the genus. In general form the species recalls *unicolor*, Fitch.

SOME NEW SPECIES OF COCCIDÆ.

BY J. D. TINSLEY, MESILLA PARK, N. MEX.

Dactylopius Quaintancii, n. sp.

Adult ♀. Length, 2 mm. Width, 1.5 mm. Shape, ellipsoidal, much flattened. Colour, dark grayish-brown, the body is so covered with white secretion that its true colour only shows on the ventral surface, the colour of the dorsum appearing quite white. The white secretion mealy, projecting slightly on the lateral margins, but not forming well-marked filaments; posteriorly it is produced into two very short, but well-defined, caudal filaments; on the dorsum it is slightly raised into a longitudinal ridge.

In addition to the mealy secretion, there is some fine, waxy, thread-like secretion as in *D. virgatus*, Ckll. They produce no well-defined ovisac, only a fluffy mass of secretion.

Boiled in caustic potash they become, at first, almost black, and on further boiling they become purplish. Legs and antennæ brownish, but very much lighter than the body.

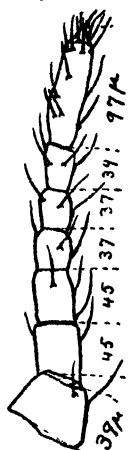


FIG. 17.

Antennæ 7-jointed: 7 longest, slightly longer than $2 + 3$ (90-100 μ); 2 and 3 next longest, usually subequal, about twice as long as broad; 1 and 6 next longest, often subequal, 1 sometimes the longer; 4 and 5 shortest and usually subequal. The antennæ are fairly stout, especially joints 1, 2 and 3; all joints are hairy, the hairs being long and slender. Antennal formula 7(23)(16)(45). (See Fig. 17.)

Legs.—Femur very stout, being only about twice as long as broad, with scattered, long, slender hairs; tibia stout, its width about half that of the femur, with a few long, slender hairs; tarsus stout, quite hairy, bearing a pair of long, slender digitules; claw stout, bearing a pair of knobbed digitules. Leg resembles that of a *Ripersia*. (See Fig. 18.) Male unknown.

Habitat.—Lake City, Florida, Feb. 9, 1898. On *Rhus copallina*, L.; collected by Mr. A. L. Quaintance.

Remarks.—The most prominent characteristics of this species are: Its small size, stoutness of legs and antennæ, and the comparatively great length of the terminal joint of the antenna.

DACTYLOPIUS VIRGATUS, Ckll.

Some time since I received from Mr. E. E. Green, of Ceylon, specimens of *Dactylopius ceriferus*, Newst., and, having at hand the type material of *virgatus*, I carefully compared them, both as to their external features and their antennæ and legs.

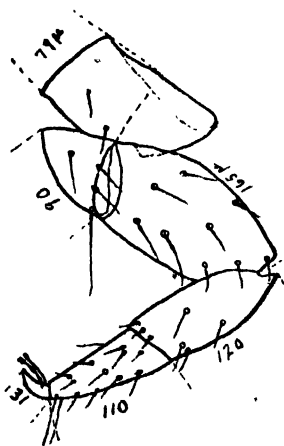


FIG. 18.

The specimens from either Jamaica or Ceylon differ as much in size and colour among themselves as they differ from those of the other locality.

The Jamaica specimens agree quite closely with Mr. Newstead's description, and *vice versa*.

To form an idea of the variability of this species one has only to note the fact that Mr. Cockerell distinguished four varieties in addition to the typical species growing on various plants in Jamaica.

The most prominent characters, which are constant, are, first, the elongated shape, tapering posteriorly, and second, the presence of the peculiar waxy filaments which are quite distinct from the ordinary white filamentous secretion of the genus.

The antennæ are quite variable, as may be seen from the following measurements of the type material from Jamaica: First joint, 45-60 μ ; second, 55-80 μ ; third, 85-95 μ ; fourth, 45-55 μ ; fifth, 50-65 μ ; sixth, 55-60 μ ; seventh, 53 μ ; eighth, 115-120 μ .

Measurements of the Ceylon material vary as follows: First joint, 59-65 μ ; second, 67-76 μ ; third, 90-104 μ ; fourth, 53-57 μ ; fifth, 53-65 μ ; sixth, 51-62 μ ; seventh, 56-62 μ ; eighth, 120-127 μ . I have also recently examined specimens from Mexico, and find them to fall between the Jamaica and Ceylon specimens in size. It will be noticed that the Ceylon specimens are longer than those from Jamaica.

The variations in relative length are well shown in the following antennal formulæ:

<i>Jamaica specimens.</i>	<i>Ceylon specimens.</i>	<i>Mexico specimens.</i>
(83)(24)(567)	382(4567)	832(45)(16)7
83267(45)	83216745	8324(16)57
83(26)(57)14	8321(67)54	
832(156)47	83245716	
832(4567)		

Joint 3 of the antenna is, however, always quite long, always appreciably longer than 2.

Legs agree perfectly with the published descriptions.

After this careful examination, I am convinced that these are all one species, and since Mr. Cockerell published his *virgatus*, about a year previous to Mr. Newstead's publication of *ceriferus*, *D. ceriferus*, Newst., will stand as a synonym for *D. virgatus*, Ckll.

The Mexican specimens were collected on coffee at Cuantla, Morelos,

Mexico, July, 1897, by Mr. A. Koebele, and sent to the New Mexico Expt. Station by Mr. L. O. Howard. This is the first time that *D. virgatus*, Ckll., has been found in Mexico.

PHENACOCOCCUS MINIMUS, n. sp.—Adult ♀. Length about 1 mm. Shape, somewhat globular. Colour, reddish-pink.

Body nearly naked, and shining. No lateral filaments; a pair of short, stout, flattened, caudal filaments.

Antennæ (see Fig. 19) of 9 segments: segment 9 longest: segments 2 and 3 next longest, these may be subequal, or three may be the shorter; segment 1 next, and fairly stout; segment 6 about same length as 1, although it may be a little shorter; segment 7 next; segments 4, 5 and 8 subequal, and shortest.

Formula 9(23)167(458). Segments of antennæ with very long, fine hairs. While the fully-developed antennæ have 9 segments, and are well represented in the figure, yet a large proportion of the individuals examined have 7 and 8 segments. Those with 8 segments are due to the failure of segment 8 to divide. Those with 7 are due to lack of division in 3 and 8. The division in the 8th segment (terminal segment) is never so distinct as that between the other segments.

Legs—Femur, length 185μ , width 50μ ; with some long, slender hairs. Tibia, length 185μ , width 30μ , with rather slender hairs. Tarsus, length 85μ , proximal end nearly as wide as tibia, tapering toward the distal end to join the slender claw; hairs similar to those on tibia; a pair of slender hair-like digitules, not knobbed. Claw, length 25μ , slender, with a small denticle on its inner face. A pair of slender, knobbed digitules longer than the claw.

Anal ring normal. Anal lobes well developed.

Ovisac.—Apparently without definite shape, just a fluffy mass of fairly coarse filaments, enclosing the pale yellow, almost white, eggs, and partially enclosing the female.

Male unknown.

Habitat.—On silver spruce, *Picea pungens*, Engelm. The specimens were near the end of the twig on one side, at the base of the needles, and had apparently caused the death of the needles.

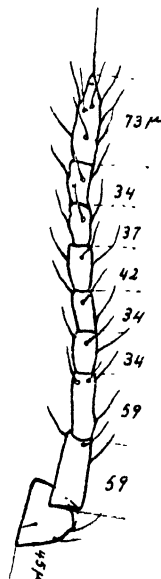


FIG. 19

Collected by Prof. C. P. Gillette, at Fort Collins, Colo., May 20, 1898.

The minute size of this species easily distinguishes it from any species known at present. Unless considerable care is exercised only the 7- and 8-segmented antennæ will be found, and one would, from this, be inclined to call it a *Dactylopius*.

NOTE ON A CHALCIDID OF THE SUBFAM. ENCYRTINÆ, PARASITIC
ON PHENACOCOCCUS MINIMUS.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Tetracnemus Westwoodi, n. sp.—♂. Length $1\frac{1}{2}$ mm.; dark brown; head and thorax minutely reticulated; ocelli large and prominent, lateral ocelli nearer to the eyes than to the middle ocellus; scutellum prominent; scapulæ triangular, produced to a point mesad, failing to meet by a short interval only; coxæ large and swollen, trochanters small, legs long, tarsi five-jointed. Antennæ 8-jointed, or 10 jointed if the two ring-joints are counted; first joint of flagellum subglobose, short; second about as long, but cylindrical; third about twice as long as second; fourth about one-third longer than third; fifth about as long as fourth; sixth (club) a little longer. First four joints of flagellum emitting long branches as in Westwood's figure of *T. diversicornis*. Club slender, considerably less swollen than in *diversicornis*. Wings strongly pubescent.

Hab.—Fort Collins, Colo.; parasitic in *Phenacoccus minimus*, Tinsley; collected by Prof. Gillette. Prof. Tinsley directed my attention to this interesting parasite, which he found when describing the *P. minimus*. The parasite is almost as large as the host, and always occurs singly. Prof. Tinsley observes that the head of the parasite is invariably turned to the tail of the *Phenacoccus*. The only specimens yet available for study are those mounted (after boiling) with the coccids, still enclosed in the skin of the host, though fully formed in every respect. It may be that specimens preserved in the usual way will show a somewhat different coloration, but the structural details will not be altered. The species is dedicated to the founder of the genus, who was the greatest of English entomologists. It differs in the scapulæ, the antennal club, and some other particulars, from *T. diversicornis*. The genus is new to America. (See L. O. Howard, Proc. U. S. Natl. Museum, XV., p. 362.)

Since the description of *Tetracnemus Westwoodi* was written, we have received many living specimens, of both sexes, from Prof. Gillette. The living insect is black, with a slight metallic tinge, the mesothorax a bluish-black, the scutellum purple-black, rather sharply contrasting. Antennæ of ♂ dark brown; of ♀, with scape and club, brown-black, the intermediate portion white. Legs yellowish-white, tarsi more or less infuscated, hind femora black.—T. D. A. C.

Mailed August 9th, 1898.

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No. 9.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS,
U. S. NATIONAL MUSEUM.

(Paper No. 4.)

FAMILY VIII.—LOPHYRIDÆ.

The Swedish entomologist, C. G. Thomson, first separated this family as a tribe in 1871. It had been placed previously with the *Lydides*, with which it had no affinity whatever. In the structure of the head, thorax and abdomen the species approach closest to the *Hylotomidæ*, *Perreyiidæ* and the *Pterygophoridæ*. The multiarticulate antennæ, however, separate them at once from the former; the distinct anal cell in the hind wings separates them from the *Perreyiidæ*, which have none; while from the last, to which they are undoubtedly most closely allied, they are readily distinguished by having a distinct lanceolate cell in the front wings.

The larvæ are social in their habits and feed exclusively upon coniferous trees—the pines, firs and cedars. Only two or three species are known outside of the Palearctic and Nearctic regions.

But two genera are known, distinguished as follows :

Table of Genera.

Hind wings with two discal cells; front wings with the second and third submarginal cells each receiving a recurrent nervure.

Lanceolate cell with a straight or an oblique nervure; ♂ antennæ
ramose..... *Lophyrus*, Latreille.

Lanceolate cell contracted at middle, closed; ♂ antennæ bi-
ramose..... *Monoctonus*, Dahlbom.

FAMILY IX.—PERREYIIDÆ.

The absence of an anal cell in the hind wings readily separates this family from the *Lophyridæ*.

The group was first recognized by Cameron as a subfamily in 1883, who, however, placed in it only three genera, viz.: *Decameria*, *Lophy-*

roides and *Perreyia*. He says: "This group has usually been regarded as a section of the *Lophyrina*; but it differs in so many points not only from that group, but from all others, that I am justified, I think, in making a distinct section of it, and have given above the distinctive characters of the subfamily."*

Below I have placed in the group several other genera placed elsewhere by Cameron and Kirby. No species is known in our fauna, and the group, as a whole, seems to be confined to the Neotropical and Australian regions.

The genera belonging to the family may be readily distinguished by the aid of the following table:

Table of Genera.

- | | |
|---|-------------------------------------|
| Marginal cell simple, not appendiculate..... | 7. |
| Marginal cell appendiculate, the lanceolate cell petiolate. | |
| Second and third submarginal cells each receiving a recurrent nervure, rarely with the first recurrent interstitial with the first transverse cubitus..... | 3. |
| Second submarginal cell receiving both recurrent nervures; antennæ 13-15-jointed..... | 2. |
| 2. Hind wings without a discal cell, the marginal cell with an appendage; ♂ antennæ 15-jointed, biramose | <i>Lophyroides</i> , Cameron. |
| | (Type <i>L. ruficollis</i> , Cam.) |
| Hind wings with one discal cell, the marginal cell <i>without</i> an appendage; ♀ antennæ 14-jointed, ♂ 15-jointed; maxillary palpi 4-, labial palpi 3-jointed..... | <i>Lophyridea</i> , Ashm., n. g. |
| | (Type <i>L. tropicus</i> , Nort **) |
| Hind wings with one discal cell, the marginal cell <i>with</i> an appendage; antennæ 15-jointed in both sexes; maxillary palpi 2-, labial palpi 1-jointed..... | <i>Perreyia</i> , Brullé. |
| 3. Hind wings <i>with</i> one discal cell (a closed submarginal)..... | 4. |
| Hind wings <i>without</i> a discal cell. | |
| ♀ antennæ 13-jointed, the third joint very long, the following gradually shortening..... | <i>Ancyloneura</i> , Cameron. |
| 4. Antennæ 16-jointed, longer than the body..... | 6. |
| Antennæ 9-11-jointed, shorter than the body..... | 5. |

*Biol. Centr. Am. Hym., Vol. I., p. 60.

**Cameron placed this species in his genus *Lophyroides*.

5. Antennæ 9-jointed, the third joint as long as joints 4-6 united ; second and third submarginal cells subequal, larger than the first.
 ♀ Eurys, Newman.
 Antennæ 10-jointed, the third joint scarcely as long as joints 3-4 united ; second submarginal cell twice as long as the third.
 ♀ Acherocerus, Kirby.
 Antennæ 11-jointed, the third joint long, about as long as the three following joints united.
 Second submarginal cell longer than either the first or third united ; maxillary palpi 6-, labial palpi 4-jointed.
 ♀ Camptobrium, Spinola.
 Second submarginal cell shorter than either the first or third.
 Maxillary palpi 4-, labial palpi 3-jointed.
 ♀ Euryopsis, Kirby.
 Maxillary palpi 3-, labial palpi 1 jointed.
 ♀ Decameria, Lepel.
6. Head subquadrate, the temples broad ; flagellar joints long, each giving off a ramus from near the base. ♂ Cladomacra, Smith.
7. Antennæ 18-jointed, the flagellar joints scarcely longer than thick, each throwing off from near the extremity a long pilose ramus ; hind wings with one discal cell ; head transverse, the temples narrow. ♂ Polyclonus, Kirby.

FAMILY X.—PTERYGOPHORIDÆ.

This group by most authorities has been placed with the *Cimbicidæ*, possibly on account of some of the species possessing clavate antennæ, similar to *Cimbex*. The family is, however, structurally, totally different from them, and to me shows no affinity whatever with the *Cimbicidæ* ; it is in every respect more closely allied to the *Lophyridæ*, *Perreyidæ* and the *Selandriidæ*, from all of which it is readily distinguished by the absence of the lanceolate cell in the front wings.

It may be divided into three subfamilies, two of which, however, are not sharply separable, and I have had some difficulty in finding characters to distinguish them. The venation, especially in many of the genera in the subfamily *Pterygophorinæ*, has been most perplexing, since I find it totally different in the opposite sexes of the same species. Some of the females too have clavate antennæ, and thus closely mimic the females in the subfamily *Perginæ*.

It is believed, however, that these difficulties have been surmounted and that other students will now have no trouble in recognizing these subfamilies by the use of the following table:

Table of Subfamilies.

Cubitus originating from the subcostal vein beyond the apex of the basal nervure.....2.

Cubitus originating from the apex of the basal nervure or only a little away from it.

Costal vein slender towards base, but very much thickened or broadened at apical one-third; marginal cell not appendiculated and with no space between its apex and the costal margin; antennæ short, filiform in both sexes, from 6-10-jointed.....Subfamily I., Lobocerinae.

Costal vein not very much thickened and almost of a uniform thickness throughout; marginal cell at apex a little away from the costal margin, and appendiculated; first dorsal abdominal segment emarginate, or with a median slit; ♀ antennæ short clavate, 5-8-jointed, or filiform subdentate, 14-20-jointed; antennæ usually
• ramose or flabellate.....Subfamily II., Pterygophorinae.

2. Submedian cell always shorter than the median, the transverse median nervure joining the median vein very much *before* the origin of the basal nervure; ♀ antennæ filiform, the flagellar joints subdentate beneath, or clavate; ♂ antennæ flabellate or ramose; first dorsal abdominal segment with a median slit.....Subfamily II, Pterygophorinae.

Submedian and median cells equal or nearly so, the transverse median nervure being interstitial with the basal nervure; antennæ short clavate in both sexes, 6- or 7-jointed; first dorsal abdominal segment entire.....Subfamily III., Perginae.

Subfamily I.--LOBOCERINÆ.

This group, but without proper characterization, was first recognized as a subfamily by Mr. W. F. Kirby, of the British Museum, who placed in it only three genera, viz.: *Perantherix*, Westw. (= *Acordulecera*, Say); *Loboceras*, Kirby. and *Aulacomeres*, Spinola. The other genera, recorded below, he placed with the Cimbicidæ.

The subfamily is very sharply separated from the other two subfamilies, here defined for the first time, by the characters made use of in my table.

The group is confined principally to the Neotropical region, no species being known outside of the American faunæ—North, Central and South America—*Acordulecera*, Say, being the only genus which has been enabled to extend its range into the Palearctic region.

The larvæ of at least one of the genera is known: *Acordulecera dorsalis*, Say, having been bred and described by Dr. H. G. Dyar.*

The genera may be easily recognized by the use of the following table:

Table of Genera.

Hind wings with one closed submarginal cell.

Front wings with four submarginal cells, the second and third each receiving a recurrent nervure.....2.

Front wings with three submarginal cells, the first and second each receiving a recurrent nervure.

Antennæ short, 6-jointed; middle and hind tibiæ with lateral spurs.....*Acordulecera*, Say (= *Perantherix*, Westw.).

2. Antennæ 8-jointed or more.....3.

Antennæ 7-jointed.

First joint of flagellum not so long as joints 2-3 united; hind tibiæ without a lateral spur, the inner apical spur very long.....*Loboceras*, Kirby.

First joint of flagellum longer than joints 2-3 united; hind tibiæ with a lateral spur.....*Incalia*, Cameron.

3. Antennæ 8-jointed; middle and hind tibiæ with lateral spurs.....*Paralypia*, Cameron.

Antennæ 9-jointed; middle and hind tibiæ without lateral spurs.....*Aulacomerus*, Spinola.

Antennæ 10-jointed, the third joint about as long as joints 4-5 united, or a little longer, but slenderer; middle and hind tibiæ with lateral spurs.....*Cerealcæ*, Kirby.

Subfamily II.—PTERYGOPHORINÆ.

The credit for this subfamily should be given to Mr. Peter Cameron, who, in his Monograph of the British Phytophagous Hymenoptera, Vol. III., p. 72, remarks as follows: "*Pterygophorus* also belongs to a distinct subfamily, which differs both from the *Lophyrina* and *Perreyina* in the lanceolate cell being obsolete. The accessory nervure in the hind wings is also absent; the latter have only one middle cellule and the anterior are appendiculated."

*CAN. ENT., Vol. XX., 1895, p. 208.

The genera recognized may be tabulated as follows :

Antennæ 7-jointed.....Corynophilus, Kirby.
(= Cephalocera, Klug.)

(=Cephalocera, Klug.)

Antennæ 14-jointed, ♀ ; third submarginal cell very small, less than half the length of the second *Brachytoma*, Westw.

Scutellum posteriorly bidentate.

Antennæ 8-jointed (or ? more), clavate. ♀ . . *Pterygophorus*, Klug.

Antennæ 18 jointed, in both sexes, filiform, subserrate, the third joint longer than the fourth *Philomastix*, Froggatt.

Subfamily III.—*PERGINÆ*.

In this subfamily the antennæ are 6- or 7-jointed, clavate, and alike in both sexes ; the cubitus always originates from the subcostal vein away from the apex of the basal nervure ; the costal vein is considerably thickened ; while the transverse median nervure is interstitial, or very nearly so, with the basal nervure.

These characters at once separate the group from the two preceding.

The larvæ too, judging from what has been published respecting them, are also quite different. Unfortunately, the published descriptions of them are very superficial and one can gain little information respecting their structure. Most of them seem to be black or brown, with yellow markings and clothed with short white hairs, which would indicate an affinity with the *Selandriidæ*. According to Mr. R. H. Lewis and Mr. W. W. Froggatt, they live on various species of gum trees belonging to the genus *Eucalyptus* — trees indigenous to Australia.

A most remarkable habit of maternal insect in the female of *Perga Lewisii*, Westw., and the only case known among the Terebrant Hymenoptera, is recorded by Mr. Lewis.* He says : "The larvæ when hatched are of a dirty green colour, with shining black heads ; they keep together in the brood, arranging themselves in oval masses, their heads pointed outwards ; but sometimes I have seen them arranged on both sides of the leaves, their heads pointed towards the edges. The mother insect follows them, sitting with outstretched legs over her brood, preserving them from the heat of the sun, and protecting them from the attacks of parasites and other enemies with admirable perseverance. I endeavoured to drive some from their posts by pricking them with the point of a black-lead pencil ; but they refused to leave, seizing whatever was presented to them in their mandibles, no doubt very formidable weapons when employed against their race. They never attempted to use their wings or move from the spot."

*Trans. Ent. Soc., Lond., Vol. I., 1836, p. 232.

The genera are not numerous and may be separated as follows :

Table of Genera.

Hind wings with one closed submarginal cell.

Front wings with four submarginal cells.....3.

Front wings with three submarginal cells.....2.

2. First submarginal cell receiving both recurrent nervures ; antennæ 6-jointed.....Paraperga, Ashm., n. g.
(Type *P. jucunda*, Kirby.)

First and second submarginal cells each receiving a recurrent nervure ; antennæ 7-jointed.....Pseudoperga, Ashm., n. g.
(Type *P. polita*, Leach.)

3. Antennæ 6-jointed, joints 3 to 5 of an equal length or nearly so ; head subquadrate, scarcely so broad as the thorax ; first submarginal cell not unusually small.....Perga, Leach.
Antennæ 7-jointed ; head very large quadrate, fully as broad or a little broader than the thorax ; first submarginal cell very small, half the length of the second, or smaller.....Neoperga, Ashm., n. g.
(Type *P. amenaida*, Kirby.)

DIASPIS AMYGDALI IN MASSACHUSETTS

BY R. A. COOLEY, B. S., AMHERST, MASS.

In January of this year Mr. A. H. Kirkland sent me specimens of a scale insect he had taken from *Prunus mume* at the Arnold Arboretum, Jamaica Plain, Mass., which on examination proved to be *Diaspis amygdali*, Tryon. A little later Mr. Kirkland sent me more specimens which he had taken from *Prunus subhirtella* at the Arboretum. Specimens of the scale were sent to Dr. L. O. Howard, who confirmed my identification, stating also that he had asked Mr. Coquillett to examine the specimens and had received the report that he could find no difference between them and *Diaspis amygdali*. The infested trees came from Japan, the *Prunus mume* in the spring of 1894 and the *Prunus subhirtella* in the spring of 1897.

These specimens, with others of the same species received from various sources, have been compared with specimens of *Chionaspis prunicola*, Maskell, received from the author of the species, without finding the slightest difference. I therefore consider *Chionaspis prunicola* a synonym of *Diaspis amygdali*, which has priority.

ADDITIONS TO MY SYNOPSIS OF THE TACHINIDÆ.

BY D. W. COQUILLET, WASHINGTON, D. C.

Since the publication of the above work several additional forms have been examined, the result of which is recorded herewith. Dr. S. H. Scudder kindly presented to the National Museum co-types of his *Tachina theclarum*, and of many of the species described in his work on the Butterflies of New England; in every case these conform to the positions assigned them in my Synopsis.

Clustomorpha hyalomoides, Townsend, is a synonym of *Xysta didyma*, Loew. It belongs to the genus *Clytiomyia*, of which *Clustomorpha* is therefore a synonym.

Cistogaster pallasii, Townsend, Proc. Ent. Soc., Washington, 1891, page 142. This reference was inadvertently omitted in the Synopsis. I have not seen a specimen which agrees with this description.

Admontia hylotomæ, n. sp.—♂. Black, the palpi and apex of proboscis yellow. Front at narrowest part two-thirds as wide as either eye, no orbital bristles, frontals descending to middle of second antennal joint, antennæ five-sevenths length of face, the third joint nearly twice as long as the second, arista thickened on the basal third, the penultimate joint broader than long; sides of face at narrowest part each nearly one-half as wide as the median depression, bearing numerous bristly hairs, cheeks one-third as broad as the eye-height, vibrissæ slightly above the oral margin, ridges bristly on the lowest third. Thorax gray pruinose, marked with four black vittæ; three postsutural and three sternopleural macrochaetæ, scutellum bearing three pairs of long marginal and a short apical pair. Abdomen polished, last three segments gray pruinose at their bases, bearing discal and marginal macrochaetæ. Wings hyaline, slightly tinged with yellow along the veins, third vein bearing two or three bristles near the base; calypteres whitish. Hind tibiæ outwardly subciliate, front pulvilli as long as the last tarsal joint, tarsi not dilated.

♀ Differs from the ♂ as follows: Front as wide as either eye, two pairs of orbital bristles, third segment of abdomen carinate on the under side, the carina thickly beset with short spines; front pulvilli one-half as long as the last tarsal joint.

Length, 6 to 9 mm. Woods Holl, Mass. Bred from *Hylotoma humeralis*, Beauv., by Dr. Harrison G. Dyar. Three males and five females. Type No. 4061, U. S. Nat. Museum.

Admontia unispinosa, n. sp.—♀. Differs from the ♀ of *hylotomæ* as follows: Apex of proboscis black. Front slightly wider than either eye, frontals descending only a short distance below base of second antennal joint, antennæ four-fifths as long as the face, the third joint from three to four times as long as the second, arista thickened on the basal half, sides of face each one-fifth as wide as the median depression, bearing a single row of bristly hairs, vibrissæ at the oral margin. Abdomen bearing only marginal macrochaetæ, destitute of spines on the under side. Wings not tinged with yellow along the veins, third vein bearing a single bristle near its base. Length, 4 to 6 mm. Opelousas, La. Eight specimens collected in June, 1897, by Mr. G. R. Pilate, and submitted by Dr. Garry de N. Hough. Type No. 4062, U. S. Nat. Museum.

Admontia tarsalis, n. sp.—♀. Differs from ♀ of *hylotomæ* as follows: Apex of proboscis brown, basal half of antennæ yellow. Front one-fifth wider than either eye, antennæ as long as the face, the third joint five times as long as the second, sides of face each one-fifth as wide as the median depression, bearing a row of macrochaetæ in continuation of the frontal row, vibrissæ on a level with front edge of oral margin, ridges bristly on the lower half. Abdomen destitute of spines on under side. Front tarsi toward the apex greatly dilated. Length, 5 to 6 mm. Opelousas, La. Two specimens collected in May and June, 1897, by Mr. G. R. Pilate, and submitted by Dr. Garry de N. Hough. Type No. 4063, U. S. Nat. Museum.

Admontia polita, n. sp.—♀. Differs from the description of *hylotomæ* ♀ as follows: Second joint of antennæ yellow, apex of proboscis brown. Frontal bristles descending only slightly below base of second antennal joint, antennæ almost as long as the face, the third joint three times as long as the second, sides of face each one-third as wide as the median depression, bearing a row of macrochaetæ, vibrissæ on a level with front edge of oral margin, only two or three bristles above each. Thorax polished, not pruinose except along the sides, scutellum destitute of a short apical pair of macrochaetæ. Abdomen not pruinose on the fourth segment, destitute of spines on the under side, discal macrochaetæ sometimes wanting. Length, 5 to 7 mm. Oswego, N. Y. (July 1 and 17, 1897; Prof. Chas. S. Sheldon), and Jacksonville, Fla. (Mrs. A. T. Slosson). Seven specimens.

Dionaa, Desv. (Synonym, *Labidigaster*, Macq.)—This genus falls

in the last couplet in my synoptic table, and will be recognized by having a single bristle at base of the third vein, the head one and one-third times as high as long, and the proboscis only once geniculate.

Dionæa nitoris, n. sp.—♂ ♀. Black, the palpi yellow. Front of male one-fifth, in the female four-fifths, as wide as either eye, frontal bristles not descending beneath the base of second antennal joint, two pairs of orbital bristles in the female, wanting in the male, antennæ three-fourths as long as the face, the third joint one and one-half times as long as the second, arista thickened on the basal third; vibrissæ slightly above the level of the front edge of the oral margin, one or two bristles above each. Thorax polished, a median vitta in front of the suture and the lateral margins, whitish pruinose, three postsutural and two sternopleural macrochaetæ, scutellum bearing three long marginal pairs. Abdomen polished, without a trace of gray or whitish pruinosity, first segment one and one-half times as long as the third, the first three bearing only marginal macrochaetæ, last segment in the female provided at its apex with a pair of curved appendages resembling a pair of pincers. Tarsi not dilated, front pulvilli of male slightly longer than, in the female scarcely one-half as long as, the last tarsal joint. Wings gray, toward the base yellowish, along the posterior margin subhyaline, calypteres white. Length, 5 mm. Corvallis, Oregon. A specimen of each sex collected July 16 and Sept. 16, 1896, by Mr. A. B. Cordley. Type No. 4065, U. S. Nat. Museum.

Chatophleps rostrata, n. sp.—♀. Black, the lower part of the face and apex of proboscis, yellow. Front slightly wider than either eye, two pairs of orbital bristles, frontals descending to middle of second antennal joint, antennæ nearly as long as the face, the third joint four times as long as the second, arista thickened almost to the middle, face in profile strongly concave, vibrissæ on a level with front edge of oral margin, two or three bristles above each, proboscis slender, the labella considerably prolonged backward. Thorax gray pruinose, marked with four black vittæ; three postsutural and two sternopleural macrochaetæ, scutellum bearing three marginal pairs. Abdomen polished, bases of last three segments gray pruinose, each segment bearing only marginal macrochaetæ, venter destitute of short, stout spines. Tarsi not dilated, hind tibiæ not ciliate. Wings hyaline, first vein bristly on its apical third, the third bearing three bristles near its base, calypteres white. Length, 3 mm. Biscayne Bay, Fla. (Mrs. A. T. Slosson), and Opelousas, La. (Mr. G. R. Pilate). Three specimens. Type No. 4066, U. S. Nat. Museum.

Hypostena setinervis, n. sp.—♀. Black, the palpi, apex of proboscis, abdomen, coxæ, femora and tibiæ, yellow, the last two segments of the abdomen partly tinged with brown. Front as wide as either eye, two pairs of orbital bristles, frontals descending to apex of second antennal joint, antennæ as long as the face, the third joint six times as long as the second, arista thickened almost to the middle, vibrissæ on a level with front edge of oral margin, ridges bristly on the lowest fourth. Thorax gray pruinose, marked with four black vittæ; four postsutural and two sternopleural macrochaetæ, scutellum bearing three pairs of long marginal and a short apical pair. Abdomen polished, bases of last three segments whitish pruinose, first three segments bearing only marginal macrochaetæ, venter destitute of short, stout spines. Tarsi not dilated, hind tibiæ sub-ciliate. Wings hyaline, third vein bristly to slightly beyond the small cross-vein, hind cross-vein nearer to the small than to bend of fourth vein, calypteres white. Length, 5 mm. Biscayne Bay, Florida. A single specimen collected by Mrs. A. T. Slosson. Type No. 4067, U. S. Nat. Museum.

Exorista dorsalis, n. sp.—♀. Black, the palpi and sometimes the sides of the abdomen, except at each end, yellow. Front from three-fifths to two-thirds as wide as either eye, two pairs of orbital bristles, frontals descending to apex of second antennal joint, sides of face and of front in front of the orbitals silvery-white pruinose, antennæ nearly as long as face, the third joint from three to four times as long as the second, arista thickened on the basal two-fifths, the penultimate joint only slightly longer than broad, facial ridges bristly on the lowest two-fifths, cheeks one-sixth as broad as the eye-height. Thorax polished, having a strong brassy tinge, without a trace of light coloured pruinosity on the dorsum; three postsutural and three sternopleural macrochaetæ, scutellum bearing three pairs of long marginal and a short apical pair. Abdomen somewhat polished, thinly gray pruinose, last three segments bearing discal as well as marginal macrochaetæ. Hind tibiæ outwardly ciliate, middle tibiæ each bearing a single macrochaeta on the front side near the middle. Wings hyaline, third vein bearing from two to four bristles near its base, bend of fourth vein destitute of an appendage, calypteres whitish. Length, 6 to 7 mm. North Mt., Pa. (Sept. 2, 1897; Mr. C. W. Johnson), and Ga. Two specimens. Type No. 4068, U. S. Nat. Museum.

Brachycoma Sheldoni, n. sp.—♂ ♀. Black, a subtriangular spot outside of each vibrissa, brown, a yellow ring on the arista beyond the thickened base. Front of male one-fourth as wide as in the female, as wide as

either eye, two pairs of orbital bristles in the female wanting in the male, frontals descending almost to base of second antennal joint, sides of face bearing bristly hairs, and on the lower portion with several macrochaetæ, antennæ from slightly over two-thirds to three-fourths as long as the face, the third joint only slightly longer than the second, arista long pubescent on basal half, thickened on the basal fifth, vibrissæ on a level with front edge of oral margin, two or three bristles above each, cheeks three-fifths as broad as the eye-height. Thorax gray pruinose, marked with three black vittæ; three postsutural and three sternopleural macrochaetæ, scutellum bearing three long marginal pairs. Abdomen somewhat polished, gray pruinose and with darker reflecting spots, last three segments bearing only marginal macrochaetæ. Middle tibiæ each bearing two or three macrochaetæ on the front side near its middle, front pulvilli of male as long as the last tarsal joint. Wings hyaline, tinged with yellow at the base, costal spine longer than the small cross-vein, third vein bristly at least half-way to the small cross-vein, calypteres white. Length, 8 to 10 mm. Oswego, N. Y. One male and three females collected in July and August, 1895 and 1896, by Prof. Charles S. Sheldon, after whom the species is named. Type No. 4069, U. S. Nat. Museum.

ON SOME SMALL BEES FROM ARIZONA.

BY T. D. A. COCKERELL, MESILLA, N. M.

Some time ago Prof. C. F. Baker sent me a lot of small bees collected by Dr. R. E. Kunzé at Phoenix, Arizona, May 12, 1897, "on willows and various low herbs." I have examined these with interest, as they belong to genera not recorded from that region; they prove to be as follows:

- (1.) *Perdita salicis*, Ckll., 1896.—♂. ♀. Very many specimens.
- (2.) *Prosapis mesillæ*, Ckll., 1896.—A few, mostly males.
- (3.) *Halictus meliloti*, Ckll., 1895.—One ♀.
- (4.) *Halictus pseudotegularis*, Ckll., 1896.—On April 12, 1897, I took at flowers of *Sisymbrium*, in Mesilla, N. M., a single *Halictus* which differed decidedly from Illinois *H. tegularis*, but, to my surprise, almost agreed with the Mexican *H. pseudotegularis*, except that the wings were clear. Now, among the Arizona bees I find examples of *pseudotegularis* with slightly dusky wings, as in the type of that species; the second sub-marginal cell is noticeably smaller than in *tegularis*, and receives the recurrent nervure further from its end.

(5.) *Halictus Kunzei*, n. sp.—♀. Length hardly 5 mm.; head and thorax shining olive green, abdomen ferruginous, the apical two-fifths blackish. Head rather large, considerably broader than thorax, finely and rather closely punctured, facial quadrangle nearly as broad as long; face with only a few scattered hairs on its lower part; flagellum ferruginous beneath, except at base; clypeus with its apex darkened, its disc smooth, with only a few scattered punctures; mandibles ferruginous except at base; thorax almost entirely nude. Short white hairs on hind part of metathorax and lower part of pleura; mesothorax and scutellum very shiny, punctured at the sides, the punctures becoming scattered centrad, leaving the disc smooth, nearly impunctate; basal enclosure of metathorax semilunar, with fairly strong rugæ; pleura well punctured; tegulæ testaceous; wings hyaline, faintly yellowish, subcostal nervure black, other nervures and stigma honey-colour; third submarginal cell bulging outwardly, narrowed much less than one-half to marginal; legs piceous, with thin white pubescence, knees and tarsi somewhat paler and more ferruginous; spurs pallid, hind spur of hind tibiæ with large teeth; abdomen of the usual form, shining, impunctate, naked, with a very little pubescence at the end; ventral surface ferruginous, with very little hair. The cheeks are broad, but not produced below. One ♀. Known from the few species of similar coloration by the smooth, not granular, mesothorax, etc. It is perhaps nearest to *H. impurus*, Cr., but differs by the scanty pubescence of face, colour of nervures, etc.

(6) *Ceratina arizonensis*, n. sp.—♂. Length about $3\frac{1}{2}$ mm., shining black; face narrow, entirely ivory white up to level of antennæ, except the supraclypeal area, which is black; lateral sutures of clypeus marked by a black line; anterior edge of clypeus with a dark spot on each side; labrum ivory-colour, with a dark spot on each side; mandibles black, ferruginous towards ends, but dark at tip; vertex smooth and impunctate, occiput with strong, large punctures; cheeks smooth and impunctate, except quite posteriorly; flagellum brown; mesothorax punctured in front and along hind margin, centrally impunctate; scutellum punctured; base of metathorax minutely striate-granular, more or less tessellate; tarsi pale ferruginous, anterior tarsi more or less white in front; anterior tibiæ white in front, brownish-ferruginous behind; anterior femora black, apex and a stripe beneath for the apical two-thirds, white; four hind knees white, the white continued as a stripe on the tibiæ; tubercles white; wings rather dull hyaline, strongly iridescent,

nervures and stigma piceous or dark brown; abdomen punctate, apex broadly truncate, the truncation slightly concave.

Several specimens. This species does not resemble any of those described from North America. In its black colour, and the truncate apex of the abdomen, it resembles the European *C cucurbitina*, Rossi. In the pale face it resembles *C. Marawitzii*, Sickm., and *C. flavipes*, Sm., from China. It is therefore a species of unusual interest.

A NEW SQUASH BUG.

BY F. H. CHITTENDEN, WASHINGTON, D. C.

In the course of an investigation of insects affecting cucurbits, begun in a preliminary way in the season of 1897, as a part of the official work of the Division of Entomology of the Department of Agriculture, it was found that we have in addition to the common squash bug, *Anasa tristis*, DeG., a second species sufficiently resembling it as to have readily escaped the notice of the average observer, but at the same time quite distinct in all its stages. This species is *Anasa armigera*, Say, and it was first observed on cucurbits by the writer July 12, near Colonial Beach, Va., where it occurred on cucumbers. Afterward it was taken by the writer and Mr. F. C. Pratt, of the Division of Entomology, who has assisted in field investigations and collections on different cucurbits, at Ballston, Va., Poolesville and Seat Pleasant, Md., and on the Conduit Road and at Tenleytown, D. C. At the last mentioned place it occurred in great abundance on a late crop of cucumbers and watermelons. As late as the 29th of September, all stages of the insect were found, including the egg. The present year the species was found to be nearly as abundant in some localities as the common squash bug. Such was the case at Marshall Hall, Md., and in one locality in the District of Columbia. It was also observed on squash at College Station and Kensington, Md., and on cucumber at Cabin John, Md.

Anasa armigera appears to have very much the same habits as its more common congener, preferring squash of all cultivated plants, but feeding on canteloupe and other cucurbits when squash is not available. It is noticeably more active than *tristis*, flying freely in the hot sunshine and exposing itself on the upper surface of the leaves in midday. It also has a later season, appearing three weeks later, according to recent observations, and remaining in the field after the common species has gone into hibernation. Evidently it is a southern form, and perhaps has

not till recently been present in such numbers as we now know it to be in and about the District of Columbia. It has not, to my knowledge, been taken in this neighbourhood prior to 1884, when a single individual was captured by Mr. Otto Heidemann, in the District of Columbia. Now it is present here wherever curcurbits are grown, and it has come to stay if the last two seasons are a criterion. A number of these bugs were placed on a squash plant on the Department grounds the 1st of October, 1897, and the following July several were collected there that had very evidently survived the winter from this lot, as there is little possibility that they flew in from some outside source.

The species has been sent in through correspondents of the Department but once. August 5, 1898, specimens were received from Mr. H. J. Gerling, with report that they were taken on cucumber at St. Charles, Mo.

For the identification of this species, it should be said that it is of nearly the same size as *tristis*, but may be easily distinguished by its broader prothorax and more prominent angles, the reflected sides of the abdomen, showing four prominent white marks on the hemelytra, and its armed femora, whence is derived its specific name. The upper surface is brown, the legs and first joints of the antennæ whitish, spotted and irrorated with black. In front of each eye is an acute porrect spine.

The egg is of nearly the same size and proportions as that of *tristis*, but it is much lighter in colour, being light golden bronze instead of dark bronzy brown, the normal colour of the latter. In its active stages, however, it is quite distinct, being lighter in colour, with the legs ornamented by alternate bands of red or black and white.

It is impossible at present to define the exact economic status of this species. Certainly it is not a first-class pest in its northern range, and, from its observed later appearance, hardly likely to become so. It is capable, however, of injuring late crops of all the curcurbits.

In addition to the localities mentioned, the species is known from Kansas, Western Iowa, and Florida.

It is hoped that the readers of this publication who have opportunity of observing curcurbit insects will keep a lookout for this squash bug, and send specimens, if they are successful in securing them, that we may be able to identify the species and thus learn more of its distribution. Specimens will be returned if desired.

NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

III.

BRACHYNEMURUS HUBBARDII, new species.

Male.—Length, 46 mm.; expanse of wings, 49.5 mm.; greatest width of anterior wing, 6 mm.; length of antenna, 9 mm. Very slender; yellow, marked with dark fuscous; sparsely hairy, more thickly on abdomen.

Face scarcely convex, yellowish; above, a broad pitchy-black band, notched in middle below, extending around the antennæ on outer side; a faint fuscous line extends from centre of notch almost to clypeus; furrow between face and inner orbit of the eye, fuscous. Circumocular area yellowish, except along depressed portion of the vertex, where it is dark fuscous, and below, near maxillary palpiger, where there is a black spot. Clypeus yellowish, with a few coarse black hairs. Labrum transverse, rounded laterally and narrowed anteriorly, somewhat emarginate in front, yellowish, slightly tinged with rufous, several coarse dark hairs on anterior border. Mandibles piceous, black at tips; on inner edge, near apex, a tooth.

Maxillary palpi yellowish, slightly tinged with rufous apically; first two joints short, subequal, about as broad as long; third joint somewhat longer than first two together, perceptibly curved, enlarged apically; fourth joint straight, a little shorter than third; last joint somewhat longer than third, subcylindrical, truncate at tip, and slightly notched.

Labial palpi about same length as maxillary, yellowish; first joint not quite twice as long as broad, enlarged apically; second joint more than twice as long as first, slightly curved, strongly widened and thickened apically; third joint about same length as second, fusiform, faintly hairy, tinged with rufous around ocelloid spot and on tip; the latter fine, truncate, slightly notched.

Maxillary palpigers yellowish, with some dark fuscous spots. Labium, labial palpigers, mentum and gula yellowish, the latter clouded with fuscous; the mentum bears a long, coarse, black bristle and a few black hairs.

Antennæ clavate, longer than head and thorax; fuscous, articulations yellowish, more distinctly so on basal joints; clothed with very short,

stiff hairs ; first and second antennal joints piceous, yellowish at bases and apices ; a yellowish crescent bounds base of first joint in front. Between the antennæ posteriorly, a narrow transverse yellowish band.

Vertex elevated behind, rounded, yellowish ; in front, on depressed portion and anterior part of elevated portion, dark fuscous ; longitudinal median furrow and an irregular spot each side, behind, dark fuscous.

Pronotum as broad as long at base, somewhat narrowed anteriorly, yellowish ; anterior angles rounded, front margin slightly emarginate ; four longitudinal dark fuscous lines.* Lateral carinæ yellowish. Below yellowish ; on each side, at base of anterior legs, a dark fuscous spot, produced anteriorly along the carina.

Mesonotum yellowish ; lobes moderately elevated, marked similarly to those of *B. 4-punctatus*.† Sides and beneath yellowish, marked with fuscous.

Metanotum yellowish, lobes less elevated than those of mesonotum ; marked much as those of *B. 4-punctatus* ; the two longitudinal lines which unite to form the "U" and heart-shaped markings in the latter, however, approach medially, but do not meet, in this species, giving the appearance of a letter "X" when viewed from a distance. Sides and beneath yellowish, marked with fuscous.

Abdomen longer than wings, yellowish, a fuscous stripe each side, on dorsum and venter ; the dorsal stripe is separated from the ventral by the lateral suture only ; a longitudinal median fuscous stripe on venter on basal segments. A longitudinal median fuscous line, also, on dorsum of apical segments. All markings of apical segments more extended so as to make these segments almost entirely fuscous.

Tip of abdomen luteous, clouded with fuscous ; clothed with long dark hairs ; appendages one-half the length of seventh segment, slender, somewhat flattened laterally, divergent on apical half ; luteous, clouded with fuscous, clothed with coarse black bristles ; between the appendages below, a short triangular fuscous plate.‡

Legs short and slender, yellowish, beset with numerous black hairs

*On the female specimen, the outer lines are nearly interrupted at the transverse furrow.

†CAN. ENT., XXX, 5, 1898, p. 138. These markings seem to be, in a rough way, continuations of the four longitudinal lines of the pronotum.

‡This seems to be the ventral projection of the short eighth segment.

and some coarse black spines (most of which latter are black, the rest luteous); tibiæ each with a transverse piceous line on outer side near base; sometimes clouded with piceous at articulations with femora; ringed with piceous at their apices. Tibial spurs as long as first two tarsal joints, in anterior and middle legs (in posterior, somewhat shorter); slightly curved, rufo-piceous. Tarsal joints piceous at their apices; claws considerably more than half the length of last tarsal joint, moderately curved, rufo-piceous.

Wings of moderate size, hyaline, the posterior margins sinuate apically; venation hairy. Pterostigma small, luteous, reaching forward only half way to the costal margin. Intercostals in apical half of anterior wings forked, a somewhat less number forked in posterior wings. Veins luteous, interrupted, principally at junctures with other veins, with fuscous.

Anterior wings with series of small fuscous spots or cloudings, principally along anterior side of submedian vein and posterior side of the first longitudinal vein above it; a few spots and cloudings also at tip of submedian vein, at bases of smaller forks, and along veins near posterior border; posterior wings quite a little shorter than anterior, immaculate. Posterior borders of both wings fringed with fine hairs.

Female.—Length, 28 mm; expanse of wings, 49.5 mm.; greatest width of anterior wing, 6.3 mm.; length of antenna, 6 mm.

Antennæ more clavate than in male. Abdomen a little shorter than wings; marked similarly to that of the male, but the mid-dorsal stripe exists on all the segments, while the mid-ventral stripe of basal segments is absent. Tip of abdomen luteous, clothed above with long black hairs; superior parts split; inferior part beset with coarse, blunt, black spines; below, two small cylindrical luteous appendages, three times as long as broad, with some very long, black hairs or bristles. Anterior wings almost immaculate, a few very small faint cloudings along submedian and post-costal veins.

Type.—No. 4070, U. S. National Museum. One male specimen collected at Fort Grant, Arizona, July 22, 1897, by Mr. Henry G. Hubbard.

No. 4070 a, U. S. National Museum. One female, with same locality and date, collected by Mr. Hubbard.

A handsome little species, resembling somewhat, in general appearance, *B. abdominalis* (Say).

NEW COCCIDÆ.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Eriococcus adenostomæ, n. sp.

♀ enclosed in an oval (at one end more or less pointed) sac about 3 mm. long and $1\frac{1}{2}$ mm. broad, woolly, snow-white, of uniform texture.

♀ oval, about half again as long as broad, dark purple, turning bright crimson when placed in K. H. O. Body about $1\frac{1}{2}$ mm. long. Antennæ light brown, 7-jointed, formula: approximately (347) (12) 56, joint 3 equal 5 + 6. Most of the joints with hairs; joint 7 with several comparatively long hairs.

Legs light brown, large and stout. Each joint with one or more bristles. Femur quite swollen. Tarsus a trifle longer than tibia. Claw stout and curved. Both tarsus and claw with long filiform digitules.

Posterior tubercles short and rounded, with one very long, stout bristle and two shorter ones on their outer margin. Anal ring large, with eight long bristles. Derm colourless, with quantities of small spines and rounded glands distributed all over the dorsum.

Sac of ♂ smaller and narrower than that of the ♀, colour more creamy.

Hab.—On *Adenostoma fasciculatum*, in the mountains, near Mountain View, Cal.

Lecanium pubescens, n. sp.

♀ scale about 4 mm. long, $2\frac{1}{2}$ broad, and 2 mm. high, moderately soft, before gestation covered with very soft hair. Colour blackish-brown, more on the black, with a yellow longitudinal band on the dorsum. Dorsum pitted and margin slightly wrinkled. Some specimens show a lighter colour. When removed from twig the insect leaves a small amount of white powder.

Derm by transmitted light colourless, except margin, which is light brown, with numerous small round gland pores. Margin with a double row of minute simple spines, lateral incisions with one moderately stout spine and two short ones. Anal plates large, outer corner forming a right angle, with several hairs at tip and a long, stout hair on each plate. Anogenital ring with six long, stout hairs. Legs slender. Tibia and tarsus about equal. Femur a little longer than tibia. Coxa, trochanter and femur each with a hair. Claw curved, with slender

knobbed digitules. Tarsal digitules with very fine, long, knobbed hairs. Antennæ 7-jointed, formula: 43 (12) 7 (56). Joint 4 very little longer than 3. Joint, 1, 2, 4, 6 each with a hair; joint 7 with several hairs.

♂ scale glassy white with median ridge, about $1\frac{1}{2}$ mm. long.

♂ body dark red-brown, legs and antennæ light brown. Wings extend $\frac{1}{3}$ beyond body, colour iridescent. Thorax with two elevated ridges much darker than body. Antennæ very hairy.

Hab.—On *Quercus* sp., in the mountains, near Mountain View, Cal.

Lecanium Crawii, n. sp.

♀ scales not crowding each other; hemispherical, about 3 mm. long, 2 mm. broad and $1\frac{1}{2}$ mm. high, oval, shiny, brown, getting darker with age. Margin generally lighter than dorsum.

♀ before gestation light brown, shiny. Derm. by transmitted light, brown, with numerous oval gland orifices. Marginal hairs very short and slender. Lateral incisions each with three stout but not long spines. Antennæ 7-jointed, 3 longest, twice as long as 4. Joints 5 and 6 very short. Joints 1 and 2 about equal. Formula: 347 (12) 56. Anal plates broad but not very large. Anogenital ring with six moderately slender hairs. Legs quite stout. Coxa and femur with stout hair. Femur very little longer than tibia. Tibia and tarsus about equally long. Claw stout and curved. Tarsal digitules moderately stout, knobbed hairs. Digitules of claw not stout, a little longer than claw, more or less club-shaped.

Larva light yellow, with distinct ridge on dorsum dividing scale lengthwise. Oval, about twice as long as broad. Rostral loop extending to third pair of legs.

Hab.—On *Acer macrophyllum*, in the mountains, near Mountain View, Cal.

Comys fusca was reared from this species.

Lecanium ventrale, n. sp.

♀ scale about $4\frac{1}{2}$ mm. long, 3 mm. broad, 1 mm. high. Oval when seen from above. Soft texture, very much like *L. hesperidum*; light brown, not very convex, and a dark brown border near margin. Dorsum pitted and margin moderately wrinkled, an indistinct mesial ridge.

♀ colour greenish-yellow, with a brown longitudinal line on the dorsum, also two brown lines forming a double cross with the dorsal line, more or less wrinkled and pitted. Ventral view shows the abdomen

a dark purple-brown with very distinct segmentation. Viviparous.

After boiling in soda, derm colourless. Margin with small curved spines. Lateral incisions with long, stout, curved spine and two shorter ones. Anal plates large, with blunt tips, bearing several hairs and notched on outer margin, together forming a square. Each plate has a distinct brown projection into the body. Anogenital ring with six hairs, which are very long, extending $\frac{3}{4}$ over the plates. Legs stout, coxa and femur each with a stout hair. Femur $\frac{1}{2}$ longer than tibia. Tarsal digitules long, knobbed hairs, digitules of claw broad and thick. Claw stout and curved. Antennæ 7-jointed, formula: 34721 (56). Joints 1 and 2 with two hairs each. Joints 4, 5, 6 and 7 with several hairs. Joint 3 very little longer than 4. Joints 5 and 6 equal. Larva lemon-yellow, very flat, shiny, oval, about twice as long as broad.

Hab.—On *tuberous plant* in Japanese Nursery, at San José, Cal.

Encyrtus flavus and *Coccophagus lecanii* were reared from this species.

SUPPLEMENTARY NOTE, AND NOTICE OF A NEW ERIOCOCCUS.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Mr. Ehrhorn has been so kind as to send me examples of all his new species above described, and I have also been allowed to examine his type slides. The following remarks are offered as a result of the examination of this material. The measurements of antennæ and legs given are all in thousandths of a millimetre:

Eriococcus adenostomæ, Ehrh.—This is a distinct little species, with a pure white sac.

The following measurements will help to separate several of our species of *Eriococcus*:

Antennæ of adult female: Segments—	1	2	3	4	5	6	7	Formula.
<i>E. adenostomæ</i> , Ehrh..... ?	25.	33.	25.	16.	16.	31.		37(24)(56).
<i>E. neglectus</i> , Ckll..... ?	16.	33.	11.	14.	25.	..		36254.
<i>E. quercus</i> , Comst..... ?	47.	53.	50.	22.	25.	42.		342765.
<i>E. Tinsleyi</i> , Ckll., n. sp. (a).... ?	31.	45.	45.	25.	19.	25.		(34)2(57)6.
" " " (b).... ?	28.	101.	16.	14.	28.	..		3(26)45.

Of course there is considerable variation, and these figures merely represent average specimens selected. The first segment is more or less ringlike, and its length could not be well measured.

Anterior leg of adult female:	Tibia.	Tarsus (excl. claw).	Claw.
<i>E. adenostomæ</i> , Ehrh.....	84.	90.	28.
<i>E. neglectus</i> , Ckll.....	62.	76.	22.
<i>E. quercus</i> , Comst.....	155.	76.	28.
<i>E. Tinsleyi</i> , Ckll., n. sp.	98.	107.	33.

In *adenostomæ* the femur is very stout; length 118, breadth 64.

The *E. quercus* studied was found by Mr. Quaintance on *Quercus aquatica*, at Lake City, Florida, Jan. 12.

Eriococcus Tinsleyi, Ckll., n. sp., was found by Prof. J. D. Tinsley, April 30th, 1898, on roots of *Atriplex canescens*, close to the Agricultural College at Mesilla Park, New Mexico. The sac is 4 mm. long, of the ordinary form and texture of the genus; yellowish-white. Female removed from ovisac plump, 3 mm. long, nearly 2 broad, not tapering behind, delicately and very thinly pubescent, pale brown with a purple tinge, two purplish dorsal bands faintly indicated. Legs and antennæ light brown. Antennæ sometimes with 6, sometimes with 7, segments, as above. The ♀, placed in K. H. O., immediately turns brilliant crimson.

Larva pale sage green, naked. Immature ♀ purplish-gray, quite bristly with white filaments, or it may be better to say, thinly but conspicuously beset with short white bristles. Eggs pale lemon yellow. Allied to *E. dubius*, Ckll.

Lecanium pubescens, Ehrhorn, is a *Eulecanium* related to *L. quercifex*, Fitch, but differing in the smaller size, and the details of the legs and antennæ. Under a high power the skin is seen to be minutely tessellate, in the manner usual in the subgenus.

L. Crawii, Ehrh., is also a *Eulecanium*. It has a good deal of superficial resemblance to *L. nigrofasciatum*, Pergande, ined., being of about the same size and shape, though of a different colour.

L. ventrale, Ehrh., is related to *L. acuminatum*, Sign., but differs in the longer tarsus.

The following tables will assist in the recognition of these species:

Antennæ of adult female: Segments—	1	2	3	4	5	6	7	Formula.
<i>L. pubescens</i>	45.	45.	64.	73.	33.	28.	47.	437(12)56.
<i>L. Crawii</i>	25.	31.	53.	67.	19.	16.	33.	4372156.
<i>L. ventrale</i>	28.	39.	64.	73.	22.	25.	45.	4372165.

Anterior leg of adult female:	Tibia.	Tarsus (excl. claw).	Claw.
<i>L. pubescens</i>	118.	84.	19.
<i>L. Crawii</i>	95.	70.	
<i>L. ventrale</i>	104.	73.	16.

CORRESPONDENCE.

FOOD PLANT OF EUPHANESSA MENDICA.

On page 227, Vol. III., CANADIAN ENTOMOLOGIST, I find note of Mr. Saunders's unsuccessful endeavours to find the food plant of this species, and no record of the food plant is contained in Bulletin No. 35 of the United States National Museum, "Bibliographical Catalogue of the Described Transformations of North American Lepidoptera," by Henry Edwards. I offer the following information upon this matter: While picking the common violet, something dropped from one of the leaves, and as the leaf was considerably eaten I at once made careful search. I found a larva in the form of an eye (such as is used by dress-makers) among and hardly distinguishable from dried grasses and twigs, except by its peculiar form. I gathered nine or ten of these, in different stages, and reared them to maturity. The larva, so far as I can remember, having made no notes, varies very little in form or colour in any of its stages. The larvæ are very easily reared. The chrysalis is formed between twigs or leaves knit together by several silken threads, in which state it remains about ten days. FRANK LUCKOCK, Pittsburg, Pa.

DR. O. HOFMANN, Über die Anordnung der borstentragenden Warzen bei der Raupen der Pterophoriden.

Prof. Grote has kindly sent me a copy of this article by Dr. Hofmann, published in the "Illustrierte Zeitschrift für Entomologie." Dr. Hofmann gives figures showing the arrangement of the warts in the larvæ of certain Pterophoridae. He shows that the setæ may vary from single to multiple, that tubercles i. and ii. may be separate or united and that iv. and v. may be separate (fig. 7). On the basis of this variation, he criticises the value of the larval characters in classification, saying, "After we have seen how many modifications the normal type of wart formation may undergo in the small, well-limited family Pterophoridae, which is evidently a natural family, we cannot give the same high systematic value to it as Dyar does," etc. Dr. Hofmann has encountered an extreme case; but it does not invalidate my larval classification, as he seems to think. I have not contended that family characters were strongly marked in the larvæ, though they are often well indicated. My contention has been for the super-family groups, and these are not in any way invalidated by Dr. Hofmann's facts, as a reference to my definitions will show.

HARRISON G. DYAR.

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No. 10.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF
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(Paper No. 5.)

FAMILY IX.—SELANDRIIDÆ.

After the removal of the *Strongylogasterinæ*, which, to a certain extent, form a connecting link between this family and the Tenthredinidæ, but which, on account of their elongate shape and their cephalic and abdominal characteristics, I have placed with the latter family rather than retain here, there need be no difficulty in separating the *Selandriidæ* from all the other families by the characters made use of in my table.

The species have a peculiar *habitus* quite their own, and with a little care one may easily recognize a Selandriid without even the trouble of an examination.

The head is more transverse, the temples much narrower, not nearly so quadrate as in the *Strongylogasterinæ*; the antennæ are shorter, the scape or first joint not or rarely much longer than the pedicel or second joint; the wings are proportionately shorter and broader, the costal vein being much dilated or broadened towards the apex, before the stigma; while the abdomen is much shorter, broader and oviform.

I have separated the family into four subfamilies, distinguished as follows:

Table of Subfamilies.

Lanceolate cell petiolate (in only a single genus *Kaliosysphinga* = *Pseudodineura*, Konow, does it appear contracted, but in this genus the anal vein is faint or sub-obsolete before uniting with the submedian vein, while the anal cell in the hind wing is wanting)...Subfamily I., *Blennocampinæ*.

Lanceolate cell contracted before the middle, but still open, and sometimes with an oblique or transverse nervure between it and the apex.

Antennæ 4-jointed, the third joint very long, the fourth or last very minute Subfamily II., *Blasticotominæ*.

- Anal cell in hind wings shorter than the submedian, petiolate or subpetiolate. ♂ Periclista, Konow.
- Anal cell in hind wings fully as long as the submedian. ♂ Isodyctium, Ashm.
7. Hind wings without a closed discal cell. 9.
- Hind wings with a closed discal cell
- Claws simple, or with a very minute, scarcely perceptible tooth within. 8.
- Claws cleft, or with a large tooth within.
- Anal cell in hind wings shorter than the submedian cell.
- Transverse median nervure in hind wings received by the discal cell at or somewhat *beyond* the middle ; sheaths of ovipositor equally thickened and more or less obliquely pointed at apex ; third joint of antennæ almost as long as joints 4-5 united.
- ♀ Periclista, Konow.
- Transverse median nervure in hind wings received by the discal cell *before* the middle ; sheaths of ovipositor produced at apex into a thorn-like tip.
- ♀ Ardis, Konow.
- Anal cell in hind wings as long as the submedian.
- ♀ Isodyctium, Ashm.
8. Third joint of antennæ longer than the fourth ; sheaths of ovipositor at tips obtuse. Pareophora, Konow.
- Third joint of antennæ a little shorter than the fourth, never longer ; sheaths of ovipositor at tips rounded ; clypeus anteriorly truncate. Rhadinoceræa, Konow.
9. Anal cell in hind wings as long as the submedian.
- ♀ Isodyctium, Ashm.
- Anal cell in hind wings shorter than the submedian.
- ♂ Ardis, Konow.
10. Præsternum of mesosternum not at all separated by a suture. 11.
- Præsternum of mesosternum separated by a distinct suture ; clypeus anteriorly truncate ; hind wings with one discal cell, the anal cell shorter than the submedian ; claws long, simple. Tomostethus, Thomson.
11. Hind wings with one discal cell. 15.
- Hind wings without a discal cell.

- Hind wings with the marginal cell pointed at apex, and sometimes open 14.
- Hind wings with the marginal cell well rounded at apex, *without* an appendage ; *a surrounding nervure at apex* 13.
- Hind wings with the marginal cell well rounded at apex, but *with* an appendage ; *no surrounding nervure at apex* 12.
12. Third transverse cubitus curved inwardly, not extending in the same direction with the transverse radius, the third submarginal cell considerably larger than the first and second united ; antennæ densely pilose, tapering towards tips, the third joint longer than the fourth ; claws cleft. ♀ ♂ Parazarca, Ashm.
- Third transverse cubitus straight, or nearly so, running in the same direction with the transverse radius ; antennæ pubescent, the third joint nearly as long as joints 4-5 united.
- Claws cleft or bifid ; anal vein in front wings straight, not curving upwards at tip ; transverse cubitus in hind wings not short, the anal cell somewhat briefly petiolate.
- ♀ Erythraspides, Ashm.
- Claws simple ; anal vein in front wings curving upwards at tip ; transverse cubitus in hind wings very short, the anal cell longly petiolate. ♀ ♂ Blennacampa, Hartig.
13. Third transverse cubitus curved inwardly, not extending in the same direction with the transverse radius, divergent ; third submarginal cell larger than the first and second united ; pedicel as long as the scape, about thrice as long as thick at apex.
- ♂ Calozarca, Ashm.
- Third transverse cubitus straight, or nearly so, and running in the same direction with the transverse radius ; third submarginal cell hardly larger than the second, much smaller than the first and second united ; pedicel shorter than the scape, only a little longer than thick. ♂ Erythraspides, Ashm.
14. Third transverse cubitus in front wings not running in the same direction with the transverse radius ; marginal cell in hind wings *with* an appendage ; third joint of antennæ much shorter than joints 4-5 united ; claws with a small tooth within Scolioneura, Konow.
- Third transverse cubitus almost interstitial with the transverse radius and having the same direction ; marginal cell in hind wings

without an appendage, sometimes open at apex; claws with a strong tooth at base. Entodecta, Konow.

15. Hind tarsi usually longer than their tibiae; clypeus very small, transverse linear; antennae densely pilose, the third joint longer than the fourth; anal cell in hind wings a little shorter than the submedian. ♀ ♂ Zarca, Cameron.

Hind tarsi not longer than their tibiae; clypeus not unusually small, anteriorly subemarginate or truncate.

Antennae pubescent, the third joint distinctly longer than either the fourth or fifth.

Third submarginal cell longer than 1-2 united; antennae densely pilose, tapering off toward tips, the third joint about as long as 6-9 united. Calozarca, Ashm.

Third submarginal cell not longer than 1-2 united; antennae pubescent, the third joint not longer than 4-5 united.

Claws cleft; transverse radius and the third transverse cubitus running in the same direction; larvae with forked spines. Monophadnoides, Ashm., n. g.

(Type *M. rubi*, Harris.)

Claws simple, or with a minute tooth near the middle; transverse radius and the third transverse cubitus *not* running in the same direction, divergent; larvae smooth. Monophadmus, Hartig.

(Type *T. albipes*, Gmel.)

Antennae clothed with long appressed hairs, the third and fourths joints equal, the fifth longer, all somewhat thickened toward tips. Senoclia, Cameron.

Subfamily II.—BLASTICOTOMINÆ.

This group is confined to Europe, and is represented by a single genus, with one species, the *Blasticotoma filiceti*, Klug. The species in some of its characters, especially in the antennae, is quite anomalous. It has been shifted from one place to another by different authorities, but to me seems to belong to the Selandriidæ. The shape, especially of the head and thorax, agrees quite closely with such genera as *Rhadinoceraæ*, *Phymatocera* and *Tomostethus*, while the venation agrees fairly well with many other of the Selandriidæ, the only real difference being in the more distinctly petiolated first discoidal cell, caused by the cubitus originating farther away from the apex of the basal nervure than is

usual. The first discoidal cell in *Athalia annulata* is, however, similarly petiolated. The antennæ alone, therefore, offer any very striking difference: They are four-jointed, the third joint being very long, the fourth or last very minute. At first sight they appear wholly different from other sawflies, and I was almost inclined to consider them of family value, as I have the three-jointed antennæ in the Hylotomidæ; but on submitting them to a high-power lens I was able to see that the long third joint was resolvable into seven indistinct annulations, caused by the amalgamation of seven distinct joints. This discovery demonstrated that the antennæ were originally, in ages long past, 10-jointed, and had an affinity with such genera as *Athalia* and *Phyllotoma*. I therefore consider *Blasticotoma* to be an anomalous Selandriid. Like *Athalia*, it probably had its origin in the tropics, and has been changed structurally in its struggle for existence in a colder clime.

In addition to the 4-jointed antennæ, the genus may be further distinguished by the following characters:

Hind wings with two discal cells; claws with a small tooth within;
ovipositor subexserted.....*Blasticotoma*, Klug.

Subfamily III.—SELANDRIINÆ.

This subfamily differs from the others, except the *Blasticotominæ*, by having the lanceolate cell, in the front wings, contracted a little before the middle, but still open, *the contracted part not quite attaining to the submedian vein*. This cell is also sometimes divided by an oblique or transverse nervure between this contraction and its apex, a character frequently found in the *Strongylogasterinæ*, and thus some Selandriines might be easily mistaken for species in that subfamily. The *Strongylogasterines*, however, are always distinguished by the more elongate shape, the larger, more quadrate head, longer antennæ, longer scape, and by the more distinct costal cell, the costal vein being slenderer, not so much thickened towards apex.

The number of joints in the antennæ, 9-22, readily separate the *Selandriines* from the *Blasticotominæ*. The abdomen is always short, oviform, the head transverse, the temples rather narrow; the vertex, seen from the side, convexly rounded from the ocelli to the base of antennæ; there is no well-marked furrow or groove between the antennæ and the eyes, as in the *Tenthredinidæ*, while the scape is small, not or scarcely larger than the pedicel.

The genera may be readily recognized with the aid of the following table:

5. Anal cell in hind wings shorter than the submedian, petiolate at apex, claws with a large triangular tooth at base..... Endelomyia, Ashm., n. g.
(Type *M. rosæ*, Harris.)
6. Anal cell in hind wings as long as the submedian ; claws simple or with a small tooth within. ♀ ♂ Caliroa, Costa.
(= *Eriocampoides*, Konow.)
(Type *E. cinxia*, Klug., = *C. sebetia*, Costa.)
- Anal cell in hind wings shorter than the submedian ; claws cleft *Eriocampa*, Hartig.
7. Front wings with three submarginal cells, the first transverse cubitus wanting 10.
Front wings with four submarginal cells..... 8.
8. Hind wings with one discal cell..... 9.
Hind wings with two discal cells ; claws simple..... *Eriocampidea*, Ashm., n. g.
(Type *E. arizonensis*, Ashm.)
- Hind wings without a discal cell.
- Hind wings with a bordering nervure at apex..... *Tetratneura*, Ashm., n. g.
(Type *M. ignota*, Nort.)
9. Anal cell in hind wings as long or a little longer than the submedian cell. ♀ *Tetratneura*, Ashm.
- Anal cell in hind wings shorter than the submedian, petiolate at apex ; claws with a tooth beyond the middle.. *Pœcilostoma*, Dahbb.
(= *Monostegia*, Costa.)
10. Hind wings with one discal cell.
- Anal cell in hind wings shorter than the submedian ; claws with a long acute median tooth. *Pœcilostomidea*, Ashm., n. g.
(Type *P. maculata*, Nort.)

Subfamily IV.—HOPLOCAMPINÆ.

This subfamily is at once separated from the others by the distinctly contracted lanceolate cell in the front wings, the contracted part, unlike the *Selandriinæ*, *extending to and uniting with the submedian vein*. The genera are not numerous, and may be separated as follows :

Table of Genera.

Four submarginal cells, the second and third each receiving a recurrent nervure ; hind wings with two discal cells.

NOTES ON SOME ONTARIO ACRIDIIDÆ.

BY E. M. WALKER, TORONTO, ONT.

(Continued from page 126.)

III.—CEDIFODINÆ.

10. *Arphia sulphurea*, Fabricius.*Gryllus sulphureus*, Fab. Species Insectorum, I., 369 (1781).*Acrydium sulphureum*, Palisot de Beauvois. Ins. d'Afr., et d'Am., 145 (1817).*Cedipoda sulphurea*, Burm. Handbuch, II., 643 (1838).*Locusta sulphurea*, Harr. Ins. Inj. to Veg., 177 (1862).*Tomonotus sulphureus*, Sauss. Rev. et Mag. de Zool., XIII., 321 (1862).*Arphia sulphurea*, Sauss. Prodromus (Ed. Ins., etc., 71 (1884).

This species is one of the earliest to appear in the spring, making itself conspicuous on the wing by its bright yellow wings and rattling stridulation. It is quite common about Toronto in open, sandy, uncultivated lands, especially where these are scattered with low bushes and scrubby trees. I have never seen it about Lake Simcoe, though there are spots there which would apparently make a suitable home for it.

My earliest capture of the full-winged insect was on May 16th, 1896, though it probably appears some days before that.

I think it very probable that *Arphia xanthoptera*, Germ., is also found in Ontario, but have not as yet seen a specimen from here.

11. *Chortophaga viridifasciata*, DeGeer.*Acrydium viridifasciatum*, DeG. Memoires d'Ins., III., 498 (1773).*Gryllus virginianus*, Fab. Syst. Entom., 291 (1775).*Locusta* (*Tragocephala*) *viridifasciata*, Harr. Ins. Inj., 182 (1862)." " *infuscata*, Harr. Loc. cit., 181 (1862)." " *radiata*, Harr. Loc. cit., 183 (1862).*Tragocephala viridifasciata*, Thos. Syn. Acrid., 103 (1873)." *infuscata*, Thos. Loc. cit., 102 (1873).*Chimarocephala viridifasciata*, Scudd. Proc. Bost. Soc. Nat. Hist., XIX., 89 (1876).*Chortophaga viridifasciata*, Sauss. Prod. (Ed., etc., 72 (1884).

This is the first of our locusts, except the *Tettiginæ*, to make its appearance in the spring. The young are sometimes extremely abundant in the fall, but large numbers perish during the winter, and though often

numerous in early spring, they are much reduced in numbers. They may be seen in sunny sheltered spots quite early in the spring and complete their last transformation about the first or second week in May. They are found until about the middle of July, but are commonest in May and early June.

This species is the least particular about its haunts of all our *Edipodinae*, appearing in open grassy places of almost any kind, whether the soil be a sandy or a clayey one. It seems to be very generally distributed in Southern Ontario. I have seen it at Hamilton, Grimsby, Toronto, DeGrassi Pt., and Clear Lake, Peterborough Co.

The males are almost always of the brown form, *infuscata*, green examples being quite rare. I have, in fact, taken but three specimens of the latter. Of the females, on the other hand, the majority are green, but the relative proportion of the two forms is not nearly so unequal as with the males.

12. *Encoptolophus sordidus*, Burmeister.

Edipoda sordida, Burm. Handbuch der Entom., II., 643 (1838).

Locusta nebulosa, Harr. Ins. Inj., 181 (1862).

Encoptolophus sordidus, Burm. Scudd., Proc. Bost. Soc. Nat. Hist., XVII., 479 (1875).

A very local species in Ontario. I have taken only three specimens, 2 ♀ and 1 ♂, at Toronto, and have never seen it about Lake Simcoe. I found it, however, very abundant at Niagara, Sept. 11th, 1893, and its rattling stridulation could be heard from the trolley window all along the line between Niagara Falls and Queenston Heights. My Toronto specimens were taken on the following dates: About Sept. 10, 1892, 1 ♀; Sept. 21, 1896, 1 ♀; Oct. 17, 1897, 1 ♂. It is most commonly found in dry upland pastures.

13. *Camnula pellucida*, Scudder.

Edipoda pellucida, Scudd. Bost. Jour. Nat. Hist., VII., 472 (1862).

Edipoda atrox, Scudd. Ap. Hayden Geol. Survey of Nebraska, 253 (1872).

Camnula pellucida, Sauss. Prod. Ed., etc., 81 (1884).

This is a very abundant grasshopper in many parts of Ontario, especially towards the north. At DeGrassi Pt. it sometimes occurs in positive swarms, rising up from the grass by the dozens at every step. It is not usually as numerous as this, however, though always one of our

commonest grasshoppers. At Toronto it is much less abundant. It prefers dry, grassy upland pastures, but is also commonly found in other dry situations, such as burnt woods on sandy soil.

I have taken the full-winged insect from June 24 till about the beginning of October, but it is not usually seen until July, and specimens taken in late September are apt to be ragged at the tips of the tegmina and wings. I have specimens from Nepigon, Lake Superior, Aug. 27, 1897; Clear Lake, Peterborough Co., July 7 and 16, 1897; DeGrassi Pt., Lake Simcoe, July to late September; Toronto, June and September. West of Ontario, I have taken it at various points along the Canadian Pacific Railway from Manitoba to Vancouver Island.

14. *Hippiscus tuberculatus*, Palisot de Beauvois.

Acrydium tuberculatum, Pal. de Beauv. Insectes d'Afr. et d'Amer., 145 (1817).

Locusta corallina, Harr. Ins. Inj. to Veg., 176 (1862).

Ædipoda phoenicoptera, Thos. Syn. Acrid., 135 (1873).

Hippiscus phoenicopterus, Thos. Ninth Rep. State Ent., Ill., 117 (1880).

Hippiscus tuberculatus, Sauss. Prod. (Ed., etc., 87 (1884).

The "Coral-winged Locust" is rather local in Ontario as far as my experience in collecting goes. Where it does occur, however, it forms colonies of considerable size. It is quite numerous in certain spots about Toronto, but this is the only locality where I have met with it. Dr. Saunders says it is common at London, and Mr. Scudder reports it from Nepigon.

There is a great disparity in the relative number of individuals of the two sexes. Since 1893 I have seen probably more than one hundred males, but have taken but four females.

It is found on light sandy soil, covered preferably with rather long grass and generally with other plants, as lupine, scrub oak, blueberries, etc.

It appears from about the twelfth of May till near the end of June, and I have seen the nymphs late in autumn and again in early spring. Wherever I have found this species it has been associated with *Arphia sulphurea*.

15. *Dissosteira carolina*, Linn.

Gryllus (Locusta) carolina, Linn. Syst. Nat., I., 701.

Gryllus carolinus, Fab. Syst. Ent., II., 58 (1775).

Ædipoda carolina, Serv. Hist. Orthop., 722 (1839).

Locusta carolina, Harr. Ins. Inj. to Veg., 176 (1862).

Dissosteira carolina, Sauss. Prod. (Ed.), 137 (1884).

This large, well-known locust, easily recognized by its black wings with a yellow border, is common everywhere in the settled parts of Ontario, frequenting every dusty roadside during late summer and autumn. It is our most striking species when on the wing on account of its large size, ample wings, and peculiar, butterfly-like flight.

It appears about the beginning of July, the earliest date on which I have taken it being July 2, 1896, and continues till October. I have seen it at Rat Portage, the Muskoka District, DeGrassi Pt., Toronto, Hamilton, and various other places in Southern Ontario which have not been recorded.

16. *Spharagemon bolli*, Scudder.

Spharagemon bolli, Scudd. Proc. Bost. Soc. Nat. Hist., XVII, 469 (1875).

Spharagemon balteatum, Scudd. Proc., etc., 469 (1875).

Dissosteira Bollii, Sauss. Prod. (Ed.), 140 (1884).

Spharagemon aequale, Comstock. Introd. to Entom., 103, 104 (1888).

This locust is quite common about Toronto on sandy soil. It is also sometimes seen where the soil is clay, but much less frequently. I have also taken it at Stony Lake, Peterborough Co., and have seen a specimen taken at Sparrow Lake.

The earliest date upon which I have taken it was June 24, 1896 (1 ♂). Its first appearance is generally, however, a little later, and it continues to fly about until October.

Its stridulation is a rapid and rather loud, rattling sound, resembling that of *Arphia sulphurea*.

I should think it not improbable that other species of *Spharagemon* occur in Ontario, since there are two others in New England, one of which, *S. saxatile*, Morse, frequents rocky unsettled districts, such as abound in the northern part of our Province.

17. *Scirtetica marmorata*, Harris.

Locusta marmorata, Harr. Ins. Inj. to Veg., 179 (1862).

Ædipoda marmorata, Thos. Syn. Acrid., 111 (1873).

Dissosteira (Scirtetica) marmorata, Sauss. Prod. (Ed.), 141 (1884).

Scirtetica marmorata, Morse. Prelim. List N. E. Acrid., in Psyche, 105 (1894).

This is one of our most beautiful Acridians, but is very local in distribution. I have specimens taken at Sparrow Lake by Mr. C. T. Currelley, who found them very abundant. I have also taken it, personally, at Gravenhurst, Muskoka District, Sept. 27, 1897, where they were flying in considerable numbers about a dusty gravelly road close to the railway station. They were very rapid in flight, though they never flew very far, and being without a net and pressed for time, only a few were secured. Its stridulation resembles that of *Spharagemon bolli*, but is more rapid, the sound being almost a buzz.

It probably occurs in many parts of our Laurentian area, but I have had, as yet, but little opportunity of collecting in that region.

18. *Trimerotropis maritima*, Harris.

Locusta maritima, Harr. Ins. Inj. to Veg., 178 (1862).

Ædipoda maritima, Thos. Syn. Acrid., 124 (1873).

Trimerotropis maritima, Stal. Recens. Orth., I., 134 (1873).

On the sandy beaches of Toronto Island this locust flies about the coarse grass which grows at a short distance from the water's edge. In some seasons it occurs in large numbers, in others it is comparatively scarce. I have also two pairs which were taken at Kingsville on the beach of Lake Erie, by Mr. C. T. Hills, who says they were abundant there.

It is an extremely alert species and very difficult to capture, and is almost impossible to see when it alights, on account of the close similarity of its gray tints to those of the sand.

The specimens of this species found about the Great Lakes differ very considerably from the typical form of the Atlantic coast, and may possibly constitute a distinct species. The dark band crossing the wings is much broader than in the typical form, and is uninterrupted instead of being broken up into a series of sub-continuous spots. The greatest breadth of this band is nearly half the greatest breadth of the wing, while in typical *maritima* it is only about a third the greatest breadth of the wing. The base of the wings is yellower and more opaque, resembling *S. bolli* in this respect. All the markings are generally more distinct, and the tegmina and wings usually somewhat shorter in proportion. It is distinctly smaller in size, judging from specimens of the typical form which I have from Monmouth Beach, N. J. This form appears to be a distinct variety, and may be known as *interior*.

My Toronto specimens were taken between July 22 and about the middle of September, while those from Kingsville are dated Aug. 13, 1897.

19. *Circotettix verruculatus*, Kirby.

Locusta verruculata, Kirby. Fauna Bor. Amer., Insecta, 250 (1837).

Locusta latipennis, Harr. Ins. Inj. to Veg., 179 (1862).

Edipoda verruculata, Scudd. Bost. Jour. Nat. Hist., VII., 471 (1862).

Trimerotropis verruculata, Scudd. Daws. Rep. Geol. Rec., 49th Par., 344 (1875).

Circotettix verruculatus, Sauss. Prod. (Ed., 175 (1884).

With the exception of *Camnula pellucida*, this is the most abundant (Edipodine in Northern Ontario, where it finds a very congenial home, flying about the bare rocky slopes and among the burnt timber, the loud, crackling stridulation of the males resounding in every direction. It is, however, by no means confined to rocky situations, being found wherever burnt timber occurs, even in swampy places, though preferably on dry sandy soil. I found it in a burnt clearing in a large swamp of tamarack and white cedar near Lake Simcoe at a considerable distance from dry soil.

Nearly all the specimens from Northern Ontario are of a black variety, being thus afforded an excellent protection when they alight upon the blackened stumps and logs, which they very frequently do. This variety has all the markings, except those of the wings, hind tibiae and inside of hind femora almost entirely obscured by a blackish tone. I have seldom seen specimens of the mottled or southern form, though individuals intermediate between the two extremes are not infrequent. I found a dark brown, somewhat mottled variety common at Bradford on a marshy flat covered with weathered blocks and chips of wood from a sawmill; while in the rocky islands in Stony Lake, Peterborough Co., the specimens met with were frequently ash gray mottled with black.

I have occasionally heard the female stridulate, the sound being similar to that of the male, but more subdued.

It appears about the beginning of July and continues till near the end of September. My earliest capture was at DeGrassi Pt., July 2, 1896, and I heard one stridulating at Gravenhurst, Sept. 27, 1897.

My specimens are from the following localities: Rat Portage, Aug. 28, 1897 (very abundant); Molson, Lake Superior, Aug. 28, 1897; Jackfish, Lake Superior, Aug. 27, 1897; Stony Lake, July 9 to 15, 1897; Bradford, Aug. 6, 1897; DeGrassi Pt., and various other localities about Lake Simcoe. I have also seen it at Aurora, but never at Toronto, though it has occasionally been seen there by other collectors.

A NEW ALEURODES ON OAK.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aleurodes gelatinosus, n. sp.—Pupa oval, rather less than 1 mm. long, pitch black, not bearing the larval skin, margin beaded; no fringe of the ordinary kind, but the pupa is surrounded by and rests on a gelatinous-looking colourless translucent substance, which extends rather further from the margin than half the diameter of the pupa. Radiating from the pupa, resting on the translucent substance, are three conspicuous lines of white secretion, one from the caudal end, and one from each side of the cephalic end.

Adult with head and body very bright lemon yellow; wings white, semitransparent, spotless. Eyes not divided. Antennæ with second segment at least twice as long as the first; formula for the slender segments 43576.

Hab.—Pupæ abundant on under sides of leaves of oak at Dripping Spring, Organ Mts., New Mexico. Adults emerging the last week of April. The oak, according to Prof. E. O. Wootton, is probably *Quercus arizonica*, Sarg.

AUTUMN CAPTURES.

Our park caretaker unwittingly caters to the wants of the entomologist by planting every year some fine beds of Phlox Drummondii and verbenas. Last year, without a net, I took with a cyanide bottle 59 *Plusias* in one evening about the 20th of September. I was surprised to find that 22 of them were *Biloba*, the rest were *Precationis*. This year I went to the park on the 17th of Sept., better prepared for taking anything I came across. I caught *Plusia Balluca*, one; *Eroides*, one; *Simplex*, several; and *Precationis*, a few; three *Plusias* of a species not yet determined; also two *Deilephela lineata*; but the capture of the evening was a very fair specimen of *Dilophonota obscura*, which was not represented in my cabinet. I have two of *ello*, but this insect is at once easily distinguished from it by the description quoted by Mr. Moffat in the last annual report, viz., smaller size, light gray primaries, and unbanded abdomen. I thought the capture was worth recording. I have taken over 40 *Heteroceæ*, new to me this season, and my *Orillia* list is now fairly respectable,

C. E. GRANT, Orillia, Ont.

THREE MYRMECOPHILUS MITES.

BY NATHAN BANKS, WASHINGTON, D. C.

Many American entomologists have, doubtless, been much interested in the accounts published during the past year by Charles Janet on the relations of certain Myrmecophilus Acarians and their hosts. His very interesting papers have been noticed in various English and American journals. Particular attention was paid to two species of Eamasidæ, *Discopoma comata* and *Antennophorus Uhlmanni*.

A few years ago, while collecting mites on Long Island, New York, I obtained three species of Eamasidæ, which were always associated with certain ants. One, a species of *Discopoma*, is attached to the body of the ant, and appears to obtain food from it in the same manner as its European relative, by piercing the skin. But while the European species appears to choose the abdomen, the American form is, at least generally, found attached to the thorax of the host; and I have not observed more than two mites attached to one ant. There is usually but one mite fastened to the dorsum of the thorax near the median line. In some nests the mites were found on about 10 per cent. of the ants, but in other nests they were much more scarce.

Of the other two mites, one, the *Uropoda*, was found in considerable numbers associated with the same ant as the *Discopoma*, but they were not attached to the ants. The other was observed only a few times in the nests of another ant.

The ants have been kindly determined for me by Mr. T. Pergande. *Holostaspis mæstus*, n. sp.

Body one and one-half times longer than broad, broadly rounded behind, sides subparallel, narrowed in front on cephalic part, and narrowly rounded in front, quite convex above. Body above with four rows each side of clavate hairs; two lateral rows of about nine hairs, which start from the shoulders; the third row has about ten hairs, one on the cephalic part of body; the sub-median row has about twelve hairs, and starts from the anterior edge of head. On the soft posterior sides is a row of a few small clavate hairs; soft parts of venter with a few simple hairs, and some on the margins of the sternal and genital plates. Anal plate nearly circular, and almost its diameter from the hind border of the ventral plate. Legs of moderate length, clothed with a few clavate hairs on basal joints, and more and simple ones on the apical joints. Length, 1. mm.

In the nest of *Lasius alienus*, var. *americanus*; Sea Cliff, N. Y. Readily known by rows of clavate hairs, and small anal plate.

Uropoda punctulata, n. sp.

Body rather long oval, about one and one-fourth times longer than broad, broadly rounded behind, narrowly rounded in front; moderately convex, both above and below; dorsum with small hairs, mostly on the sides, and a row of much larger and stiffer hairs along the margin, and about four rows each side above, of slightly smaller size than the marginal ones, all erect; hairs of under side confined to the legs and a few on the anal plate; three on each side, and two smaller before anus; sternal plate more than twice as long as widest parts, which are just behind the second and third coxæ, narrowed in front and behind, truncate at each end, rather coarsely, sparsely punctate, anal plate more densely and finely punctate; legs short, concealed in repose, the femora (except I.) slightly margined beneath. Length, .85 mm.

In the nest of *Cremastogaster lineolata* at Sea Cliff, N. Y., Fitch described a *Uropoda* (*U. formiceæ*) found in the nest of an ant, but it is evidently different from this species.

Discopoma circularis, n. sp.

Body nearly circular, a trifle longer than broad, quite convex above, with a rather broad, thin margin all around, alike at each end, so that from top view one cannot tell which is front, clothed above with minute hairs, and many scattered, short clavate hairs, arranged in concentric rows; legs very short, when in repose not showing from above; the sternum elliptical, rather narrowed behind, its margin finely serrate, containing a central plate of same shape in front, but truncate behind; the plate is sparsely punctate, the venter behind is also punctate; the legs are clothed with minute hairs. Length, .48 mm.

Attached to thorax of *Cremastogaster lineolata*; Sea Cliff, N. Y.

A NEW SCALE INSECT FOUND ON BEARBERRY.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aspidiotus Dearnessi, n. sp.—♀. Scale suboval, about 2 mm. long, moderately convex, pale gray, more or less concentrically ridged; with the orange-yellow, partly exposed exuvix quite to one side. Ventral scale thick and distinct. The scales resemble minute oyster-shells.

♀. Dark yellowish-brown, after prolonged boiling in K. H. O. becoming transparent and almost colorless, except that the lobes remain

dark brown. No circumgenital grouped glands. Only one pair of lobes, these short, parallel, very close together, practically contiguous at the tips, their ends broad and obliquely truncate, breadth of a lobe greater than its length beyond the general margin. Apparently no squames. Margin irregularly bluntly serrulate; a small projection near the lobes, and two much larger ones at considerable distances beyond, much in the style of *A. bigelovia*. Anal orifice oval, a considerable distance from the hind end. Surface striated, with rows of small round dorsal glands, much in the manner of *A. bigelovia*. Mouth-parts large.

♂. Scale elongate, nearly parallel-sided, light brownish, with the pale orange exuvia at one end, when fresh covered by a film of white secretion.

♂. Brownish-yellow, with ample wings.

Hab.—Crowded on twigs of *Arctostaphylos uva-ursi*, collected on "shore of Lake Huron," Aug. 20, 1898, by Mr. J. Dearness.

This interesting species is not a *Diaspidiotus*, but is evidently allied to the south-western group composed of *A. bigelovia*, *A. yuccæ* and *A. yuccarum*. At the same time it is allied to *A. Signoreti* of Europe, which is the type of the subgenus *Targionia*, Signoret. For the present I believe we cannot do better than extend the subgenus *Targionia* to include all these five species.

[In his note to the Editor, Mr. Dearness states that the precise locality where he collected the infested plants was in the Ojibeway Indian Reserve in Saugeen, in the Bruce Peninsula, on the sandy shore of a little bay off Lake Huron, a favourite botanizing ground of Dr. Scott, of Southampton, Ont. Mr. Dearness does not know whether the inlet is generally known by the name of "French Bay," but that is what the Doctor calls it.]

A CORRECTION.

In an article in the October, 1897, number of the CAN. ENT., page 243, I used the name *subfasciatus* in describing a new species of *Attalus* from San Clemente Id. I have since discovered that this name had been previously used by Gorham for a Mexican species, and I would therefore propose the name *transmarinus* for the San Clemente species. Oddly enough, in looking over the Horn collection the past summer, I found specimens of *subfasciatus*, Gorh., labelled Arizona; the name must therefore enter our lists.

Superficially *subfasciatus* and *transmarinus* resemble each other very closely, but the latter may be at once distinguished by the prothorax being sinuately narrowed behind so as to produce the appearance of being broadly lobed, while in *subfasciatus* it has the normal form.

H. C. FALL.

NOTES ON ANDRENA.

BY S. N. DUNNING, HARTFORD, CONN.

ANDRENA HALLII, n. sp.

♀.—Length, 14–17 mm. Black, shining; pubescence black with patch on vertex, the prothorax, mesothorax (excepting posteriorly where pubescence is not so thick and has black mixed with ferruginous, forming a more or less distinct black-appearing band between the tegulæ), scutellum and postscutellum bright ferruginous, thick, entirely obscuring punctures on thorax. Clypeus shining, large quite close punctures, a median line impunctured; antennæ black, third joint equal to fourth and fifth combined; metathorax not shining, closely and more finely punctured; scutellum with two smooth shining spots anteriorly, a few scattered punctures near-by, otherwise roughened; postscutellum and metathorax roughened, enclosure triangular, distinctly outlined, carried to a point on posterior face, sometimes faintly and irregularly wrinkled in fore half, last half impunctured. Abdomen without hair bands, a few long scattered hairs on segments 3–4, 5th seg. pubescent and protuberant as is *vicina*; anal fimbria heavy, black; segments 1–4 depressed posteriorly, the first very slightly if at all, the remainder one-third or one-half of their length; fine scattered punctures on seg. 1–3, remainder impunctured; a sweep of hairs below like *vicina*. Wings dusky throughout, a violaceous reflection, otherwise like *vicina*; stigma and nervures piceous or very dark brown. Claws bifid, rufous; spurs black. Basal process of labrum prominent, emarginate.

Three females. Pullman, Wash. (coll. C. W. Piper), and Moscow, Idaho (J. M. Aldrich).

It differs at once from *vicina* by pubescence and punctures of clypeus.

A. MARIE, Rob.

Three females. Ames, Iowa (E. D. Ball); one from flowers of gooseberry, May 6th.

A. RHODURA, Ckll.

Two females on *Salix*, April 25th, at Hartford, Conn.

A. CASADÆ, Ckll.

Two females on *Holodiscus discolor*, Evergreen, Colo. (about 7,000 feet), July 16. One specimen shows the second segment rufous throughout. Prof. Cockerell thinks a large series may show this species to be synonymous with *prunorum*.

A. KINCAIDII, Ckll.

This species varies like *Synhalonia Edwardsii*, Cr. (see paper by Cockerell, Proc. Acad. Nat. Sc., Sep. '97, page 347), but owing to the unsatisfactory nature and variability of the differences I have not named the races into which it falls.

(1) Typical *Kincaidii*. Seattle, Wash. 3 ♀: Vancouver Is., B. C., 2 ♀ (July 1 and July 5); Moscow, Idaho, 1 ♀. This has the abdomen more ovate in ♀.

(2) A geographical race. Pullman, Wash. 3 ♀. Abdomen sub-depressed in ♀.

My male specimens are all from Seattle and Vancouver. The only differences they show is in colour of pubescence as mentioned by Cockerell in the original description.

A. PERARMATA, Ckll. (in ed.)

I have males from Seattle, Wash. (Feb. 16 – Mch. 14), and females from Seattle (March 13–14), and Vancouver Is. (Apr. 20).

APHILANTHOPS BAKERI.

♂. The "lobes" in the co-types take the form of dentations in a larger series. Third joint antennæ *as long or almost as long* as joints 4–5 combined. The first abdominal segment is a *little* coarser in punctuation than the rest. Sometimes a yellow spot is on the mesothorax in front of the tegulæ.

♀. Differs from ♂ in larger size (12–13 mm.), face with three broad yellow stripes (not *all* yellow), clypeus 5-dentate. Montana and Colorado, Coll. Amer. Ent. Soc. and Colo. (Baker 2044). The ♀ is much like *frigidus*; the ♂ shows differences, however.

DIASPIS AMYGDALI, TRYON.

BY C. P. LOUNSBURY, DEPARTMENT OF AGRICULTURE, CAPE TOWN, AFRICA.

The article on *Diaspis amygdali*, Tryon, by Professor Webster, in the April issue of this magazine, has left me with the impression that the introduction of this insect to several widely separated sections of the United States has not aroused the apprehension among American entomologists that the advent of a pest of its importance justifies. The quotation from Mr. Tryon's letter to the effect that the insect is neither widely distributed nor destructive in Queensland is too reassuring. It constrains me to emphasize the fact that the species is a highly injurious

one in Cape Colony. A brief account of its occurrence here may not be uninteresting.

Under various common names, this insect has been known about Cape Town for at least twenty-five years. Owing to the slight attention paid to fruit culture until within a comparatively short time, and also to the lack of transportation facilities, it has not, however, become nearly so widespread as would have been the case had such favourable conditions as are found in the United States prevailed. And yet, despite of adverse circumstances, it has become established at many of the principal centres, both east and west, and in the country adjacent to the seaports. One serious occurrence in the Transvaal has been reported to me, and M. d'Emmerez de Charmoy, of the Museum at Port Louis, writes that it is destructive in Mauritius. From Cape Town, it has spread inland for about one hundred miles, and within this area I do not think there is any orchard insect pest, with the exception of the Fruit Fly (*Ceratitis capitata*), that gives greater trouble.

The peach is pre-eminently the food-plant of *Diaspis amygdali*, and notwithstanding the vigorous growth it makes in this climate, this tree is not infrequently killed to the ground; more often, branch by branch dies, and the tree becomes misshapen and unproductive. Reddish stains, both in the rind and pulp, are produced on the fruit of some varieties; and if the attack begins when the fruit is very green, malformation results. Many other food-plants are cited by Professor Webster, but the list might be greatly lengthened. The China Tree (*Melia azedarach*), known here as Syringa, a tree adapted to the requirements of several of our common scale pests, sometimes gets thoroughly coated with this one. Many Solanaceous plants assist in passing the infection from orchard to orchard; chief among these are *Solanum sodomæum*, *S. giganteum* and *S. aculeastrum* (?) (Natal Thorn). *Myoporum insulare*, chiefly grown here as a hedge plant, is similarly responsible. Fortunately, the pomaceous fruits are nearly exempt from attack; I have not seen it at all on apple, and not on more than a dozen pears.

Upwards of fifty per cent. of the insects are here destroyed by parasites on many trees, and a further large percentage is devoured by Coccinellids. But the loss might be ninety-five per cent., and still the increase be a hundred fold in twelve months. Three to four generations are passed in a year, and two hundred young from one female is not exceptional. The multiplication may prove less rapid in the Northern

States, but it is reasonable to suppose that many years may elapse before natural enemies prey on it there to the extent that they now do here.

That the insect is not an easy one to contend against in the United States may be inferred from the results obtained in the experiments recorded by Dr. Howard. In this warm climate the Californian lime-sulphur-salt wash will keep it in check if the wash is well made and thoroughly applied, and fumigation with hydrocyanic acid gas destroys eggs and all other stages when one ounce of cyanide is used for each one hundred and fifty cubic feet of enclosed space. Many suburban people have all their stone-fruit trees protected by whitewashing them from the ground to the tips of the twigs every winter.

All in all, I consider that *Diaspis amygdali* is almost as much to be feared in the peach orchard as *Aspidiotus perniciosus*. The whiteness of the scale renders the former easier of detection, it is true, but conspicuous as it is by reason of its colour, people here often unwittingly infect nursery stock in the process of budding. American nurserymen and fruit-growers are not, I feel sure, any the less likely to commit such a blunder. The insect is fond of secreting itself behind buds on young wood, and much of it is often to be found in such situations when the twigs elsewhere are quite clean.

STATE ENTOMOLOGIST OF NEW YORK.

We beg to offer our hearty congratulations to Mr. M. V. Slingerland upon his appointment to the important position of Entomologist to the State of New York. We may also congratulate the authorities of the State upon having selected one so eminently fitted for the position. Mr. Slingerland is a graduate of the College of Agriculture of Cornell University, and for the last eight years has been a member of the University Experiment Station at Ithaca. In this capacity he has published a number of admirable bulletins on injurious insects, and a large number of articles of a popular character on practical entomological subjects in various agricultural papers. He has also contributed to this magazine and to other scientific publications, many valuable papers of a more technical character. He has thus proved himself to be thoroughly well qualified to carry on the work at Albany, both in its scientific and practical departments, in accordance with the high standard maintained by his eminent predecessors, Drs. Asa Fitch and J. A. Lintner.

ABBREVIATIONS OF AUTHORS' NAMES.

BY A. RADCLIFFE GROTE, A.M., HILDESHEIM.

It is quite desirable that the names of authors should be uniformly treated according to a certain standard. To this end the Zoologists of the Berlin Museum have published a list, which has now appeared in a second edition. It is quite necessary that names which are borne by different persons, owing to their prevalence, should be so abbreviated that the particular bearer intended is designated. I give here a selection of the abbreviations of the names of chiefly American authors determined upon, and call attention to the pamphlet which is published by R. Friedländer and Sohn, Berlin :

Aaron.....	Aar.	Grote, A. R.....	Grote.
Abbot	Abb.	Guenée, A.....	Guenée.
Berg, C.....	Berg.	Gundlach.....	Gdl.
Boisduval.....	Bsd.	Harris	Harr.
Butler	Butl.	Harvey	Harvey.
Casey, Th. L	Casey.	Herrich-Schaeffer	H.-Sch.
Chambers	Chambers.	Howard, L. O.....	How.
Clemens.....	Clemens.	Hübner	Hb.
Comstock, J. H.....	Comst.	Hulst.....	Hulst.
Coquillett.....	Coquill.	Packard.....	Pack.
Cresson.....	Cress.	Reakirt.....	Reak.
Crotch.....	Crotch.	Robinson.....	Rob.
Duzee, Van.....	Duzee.	Schwarz, E. A.....	E. A. Schw.
Edwards, H.....	H. Edw.	Scudder.....	Scudd.
Edwards, W. H.....	W. H. Edw.	Smith, Emily A.....	E. A. Sm.
Fabricius	F.	Smith, J. B.....	J. B. Sm.
Fernald.....	Fern.	Smith & Abbot.....	Sm. Abb.
French, G. H.....	French.	Walsingham.....	Wlghm.

ENTOMOLOGICAL BOOKS.

We have much pleasure in informing our readers that entomological books of all kinds can now be imported into Canada free of all customs duty, and that this concession was made by the Dominion Government in consequence of the representations made to it by the President and Council of the Entomological Society of Ontario.

The Canadian Entomologist.

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No. 11.

NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

IV.

Brachynemurus brunneus, new species.

Male.—Length, 40 mm.; expanse of wings, 55.4 mm.; greatest width of anterior wing, 6.4 mm.; length of antenna, 7 mm. Slender, prevailing colour fuscous, markings luteous; sparsely clothed with black and white hairs, more thickly so on abdomen.

Face scarcely convex; lower part luteous; covered above by a broad piceous band which encircles the antennæ; furrow between face and inner orbit of the eye fuscous. Circumocular area luteous, except along vertex, where it is mostly dark fuscous, and near the maxillary palpiger, where there is a fuscous spot. Clypeus* luteous, rather short. Labrum transverse, luteous; rounded laterally and narrowed anteriorly, emarginate in front. Mandibles piceous, black at tips.

Maxillary palpi of moderate length, luteous, tinged with piceous apically, the fifth joint especially so; first two joints short, subequal in length, the first one about as broad as long, the second less broad; third joint somewhat longer than first two together, perceptibly curved, enlarged apically; fourth joint straight, considerably shorter than third; fifth joint somewhat longer than third, subcylindrical, notched at tip.

Labial palpi about same length as maxillary or slightly longer, luteous, more or less tinged with piceous apically; first joint about twice as long as broad; second joint somewhat more than twice as long as first, slightly curved, enlarged apically; third joint about same length as second, fusiform; tip narrowed and notched.

Maxillary palpigers luteous, clouded with piceous. Labium and labial palpigers luteous; mentum luteous, clouded with piceous posteriorly, with a long black bristle; in front a longitudinal median black

*One male specimen, labelled "Dunsmuir, Cal., Wickham," has a faint transverse fuscous line or series of dots separating the face from the clypeus. The female specimens have a fuscous clouding on each side of clypeus.

line passing between the labial palpi to the basal portion of the labium. Gula luteous, clouded with darker.

Antennæ somewhat clavate, as long as head and thorax, fuscous, darker before tip, sparsely covered with very short stiff black hairs; first two joints piceous, luteous at articulations; a luteous crescent bounds base of first joint in front.

Vertex elevated behind, rounded, luteous; in front, on depressed portion, dark fuscous; behind, on elevated portion, two dark fuscous bands*, the posterior irregular and spread out each side so as to approach, sometimes to meet, the anterior band. Behind this a median, oval, black or rufo-piceous spot.

Pronotum dark fuscous; a longitudinal median luteous line and one each side†. Sides of pronotum luteous, divided by a fuscous line‡. Lateral carinæ luteous. Below luteous, marked on each side with dark fuscous.

Mesonotum fuscous; lobes moderately elevated; anterior lobe with a longitudinal median line and a dot or two luteous; each lateral lobe marked with two luteous lines on its inner side; a luteous spot or two also near articulation of wing; posterior lobe with a longitudinal median luteous line, sides and rear of the lobe also margined with luteous. Sides and beneath fuscous, marked with luteous.

Metanotum fuscous; anterior lobe margined in front with luteous, with a longitudinal median luteous line; patterned similarly to mesonotum, the inner luteous line of lateral lobe forming a rough triangle, the apex of which is near middorsal line. Sides and beneath fuscous, marked with luteous.

Abdomen fuscous, articulations luteous; segments luteous above, especially at base, with a longitudinal median fuscous line.

Appendages one-half the length of seventh segment, slender, arcuate for their posterior halves, somewhat flattened laterally; fuscous, luteous near tips; clothed with coarse black bristles; there is the usual triangular fuscous plate between the appendages below; this plate is luteous apically.

*In one male specimen, collected at Dunsuir, California, by Mr. H. F. Wickham, the anterior band is very indistinctly separated from the fuscous depressed portion of the vertex.

†This line is usually most distinct in front of the transverse furrow, where it becomes a good-sized spot; it is interrupted at the furrow and in the male specimens is only faintly indicated behind it.

‡This line is divided into two parts in the females.

Legs of moderate size, luteous, with black and pale hairs and spines; dotted with piceous at bases of the spines, these dots sometimes coalescent in places; tibiæ piceous at bases and apices, each with a transverse piceous line on basal half externally. Tibial spurs longer than first tarsal joint, slightly curved, rufo-piceous; spurs of anterior and middle tibiæ longer than those of posterior. Tarsal joints piceous at their apices, the third and fourth especially so; claws a little more than half the length of last tarsal joint, moderately curved, rufo-piceous.

Wings of moderate size, hyaline. Venation hairy. Pterostigma whitish, fuscous on inner side. Apical third or more of veins of intercostal series forked. Veins light brown or fuscous, interrupted irregularly with paler; the subcostal vein darker, with a distinct luteous mark between each transversal.

Anterior wings marked as in *B. niger**, but the markings less extended and light brown in colour. Posterior wings almost immaculate. Posterior borders of both wings fringed with fine hairs.

Female.—Length, 31 mm.; expanse of wings, 58.5 mm.; greatest width of anterior wing, 6.3 mm.; length of antenna, 6 mm.

Antennæ more clavate than in male; first joint luteous behind, the following joints luteous at articulations, especially the basal ones. The luteous markings are more extended and distinct than in the males. A luteous spot or band is present between the antennæ.

Anterior fuscous band of the vertex continued posteriorly along the longitudinal median furrow; the posterior band appears like an irregular group of more or less coalescent fuscous spots, divided at the median furrow.

Abdomen somewhat shorter than wings, marked similarly to that of male, but there is little luteous on basal segments above except at middle of segments and at their articulations, the middorsal fuscous line hardly apparent†.

Tip of abdomen luteous, clouded with fuscous; clothed above with black hairs; superior parts split; inferior parts beset with coarse black spines; below two small cylindrical luteous appendages, three times as long as broad, with some very long black hairs or bristles.

Wing markings and veins somewhat darker than in males.

*CAN. ENT., XXX., 5, 1898, p. 136.

†Two of the females (co-types) have this line quite apparent, especially the specimen from Los Angeles, California, collected by Mr. D. W. Coquillett.

Type.—No. 4073, U. S. National Museum. One male specimen collected by the author at Fountain, Yellowstone National Park, August 10, 1896.

No. 4073a, U. S. National Museum. One female specimen collected by the author at Sage Creek, Wyoming, July 28, 1896.

Co-types.—Collection, U. S. National Museum. One male collected at Dunsmuir, California, by Mr. H. F. Wickham; one male collected in Los Angeles County, California, in September, by Mr. D. W. Coquillett; two females with no labels; one female from Los Angeles County, California, collection of D. W. Coquillett.

The female of this species resembles *B. niger*, but is lighter coloured, the wing markings are lighter and less extended, and the labial palpi are normal.

A BRIGHT RED PARASITE OF COCCIDÆ.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aphycus Howardi, n. sp.—♀. Length about 1 mm.; entirely bright scarlet, except the brown antennal club, sage-green eyes, and white tarsi; with the apical portion dusky. Wings dull hyaline, with a dark cloud ending at stigmal vein, whitish just beyond and hyaline at tip. Scape not dilated, club about or almost as long as the four joints before it. Mesonotum and scutellum with numerous short white hairs, mesonotum with no naked spots; mesopleura very delicately shagreened, with no longitudinal impressions.

Hab.—Mesilla Park, New Mexico; bred from *Eriococcus Tinsleyi*, Kll., on *Atriplex canescens*; collected by Prof. J. D. Tinsley. Emerged August 6th, and some days following. The colour of this beautiful little *Aphycus* is just like that of *Perdita luteola* when reddened by cyanide, and I should certainly have considered it as due to the same cause, had I not seen the species alive. The original type is now in the U. S. Nat. Museum; two or three others were bred after the description had been written. *A. Howardi* is named after Dr. L. O. Howard, in recognition of his valuable work on the parasites of Coccidæ. He has now in press a revision of the genus *Aphycus*, and the present insect was found just too late to be included in it. He has very kindly informed me that it is distinct from all the species known to him or published by others, and has given me some notes on its specific peculiarities.

NEW SPECIES OF SAPROMYZIDÆ.

BY D. W. COQUILLET, WASHINGTON, D. C.

Genus SAPROMYZA.

1. Wings hyaline, unmarked.....3.
 Wings brown along the costa, the small and the posterior cross-veins; body and its members, except the wings, yellow, antennal arista brown, second joint of hind tarsi sometimes black; three pairs of dorso-centrals, one of acrostichals, and two sternopleural macrochætæ.....2.
2. Costa and apex of wing, from the base to beyond apex of fourth vein, broadly bordered with brown, which is widely separated from the brown of the crossveins; second joint of hind tarsi yellow, third antennal joint oval, one and one-third times as long as wide, arista with a scarcely perceptible pubescence. Length, 3.5 mm. Chiric Mts., Ariz. A female specimen collected May 31, 1897, by Mr H. G. Hubbard. Type No. 4082, U. S. Nat. Museum. *Hubbardii*, n. sp.
 Costa and apex of wing, from slightly beyond humeral crossvein to beyond apex of fourth vein, broadly bordered with brown, which is connected with the brown of the small crossvein, and sends a spur which almost reaches the hind crossvein; second joint of hind tarsi yellow, third joint of antennæ elongate oval, almost twice as long as wide, arista short plumose. Length, 3 mm. Oswego, N.Y. A female specimen collected August 1, 1895, by Prof. Chas. A. Sheldon. Type No. 4083.....*Sheldoni*, n. sp.
 Costa and apex of wing, from tip of auxiliary vein to beyond apex of the fourth, broadly bordered with brown, except a short space between the apices of the second and third veins, where the brown is very narrow; the brown sends a spur to the small crossvein and another which almost reaches the brown of the hind crossvein; second joint of hind tarsi black, third antennal joint oval, one and one-half times as long as broad, arista short plumose. Length, 3.5 mm. New Bedford, Mass. A male specimen collected by Dr. Garry de N. Hough. Type No 4084.....*Houghii*, n. sp.
3. Face, pleura and scutellum destitute of round black spots.....4.
 Face marked with one, pleura and scutellum each with two black spots; yellow, an ocellar dot, first two joints of antennæ, spot on lower edge of face, one near middle of mesopleura, another on front end of sternopleura, one on each side of middle of scutellum,

- and a basal one on each side of the third, fourth and fifth abdominal segments, black ; a brown dorsal line on the last three abdominal segments, and indications of one on the mesonotum ; two pairs of dorso-centrals, no acrostichals, one sternopleural macrochæta ; third antennal joint oval, one and one-half times as long as wide. Length, 3 mm. Biscayne Bay, Fla. A female specimen collected by Mrs. A. T. Slosson. Type No. 4085.....*Slossonæ*, n. sp.
4. Mesonotum opaque black or yellowish.....5.
 Mesonotum polished black ; black, highly polished, the first two antennal joints, base and lower edge of the third, base of arista, lower edge of front above the antennæ, halteres, femora, tibiæ, middle and hind tarsi and base of first joint of the front ones, also the front coxæ, yellow ; four pairs of dorso-centrals, one of acrostichals, and one sternopleural macrochæta ; third antennal joint scarcely tapering toward the tip, two and one-half times as long as broad, arista short plumose, wings strongly tinged with yellow. Length, 4 mm. Vancouver Island, British Columbia. Two male specimens collected by Mr. C. Livingston. Type No. 4086.....*Livingstoni*, n. sp.
5. With three pairs of dorso-central and two sternopleural macrochætæ. 6.
 With only two pairs of dorso-central and one sternopleural macrochæta ; yellow, the front except the lower edge, the mesonotum, scutellum, metanotum, and a vitta on upper part of the pleura, black, opaque bluish-gray pruinose, a black spot on each side of the third, fourth, fifth and sixth segments of the abdomen ; third joint of the antennæ oval, one and one-half times as long as wide, arista long plumose. Length, 3 mm. Onaga, Kansas. A female specimen collected by Mr. F. F. Crevecoeur. Type No. 4087.....*Crevecoeuri*, n. sp.
6. Antennal arista long plumose, body very robust, wings tinged with yellow, scarcely more than twice as long as the abdomen.....7.
 Antennal arista bare, body slender, wings unusually long, over four times as long as the abdomen ; black, gray pruinose ; the antennæ, front legs, and middle and hind femora, brown ; middle and hind tibiæ and their tarsi, yellow, halteres whitish ; wings not tinged with yellow, third antennal joint only slightly tapering toward its tip, nearly twice as long as wide. Length, 3.5 mm. White Mts., N. H. One male and five females, collected by the late H. K. Morrison. Type No. 4088.....*brachysoma*, n. sp.

7. Thorax and entire insect yellow, a black spot in middle of occiput above the neck, a light yellow fascia above the antennæ, bordered above and below with brown; third antennal joint only slightly tapering to the tip, one and two-thirds times as long as wide. Length, 5 to 5.5 mm. Los Angeles Co., Cal (H. C. Fall); Corvallis, Oregon (A. B. Cordley), and Seattle, Wash. (O. B. Johnson). Two males and four females. Type No. 4089. . . . *flavcola*, n. sp.
- Thorax, scutellum, occiput and upper half of front, brown, bluish-gray pruinose; a yellow fascia above the antennæ, bordered above and below with brown, face yellowish, a U-shaped brown mark in the middle and a black line extending obliquely from each antenna to the occiput near the oral margin; antennæ, proboscis, palpi, halteres and legs yellowish, front side of femora sometimes marked with a gray vitta, apex of tibiæ and a faint ring near base of each, brown; abdomen yellowish, bases of the third, fourth and fifth segments, brown; third joint of antennæ slightly tapering to the apex, nearly twice as long as broad. Length, 5 to 6.5 mm. Dist. Colum. Four males and twenty females, collected by the writer in June, 1894. Type No. 4090. *magna*, n. sp.

Genus LAUXANIA.

1. Submarginal cell at the small crossvein less than three-fourths as wide as the length of the hind crossvein, wings more than three times as long as wide, hyaline or yellowish. 2.
- Submarginal cell at the small crossvein wider than the length of the hind crossvein; black, the first two joints of antennæ, base of arista, and first three joints of the middle and hind tarsi, yellow; front and face polished, the lateral margins narrowly white pruinose; antennæ linear, more than twice as long as the head, the third joint eight times as long as wide, arista rather long plumose; body polished, mesonotum thinly gray pruinose; wings twice as long as wide, smoky-brown, the posterior margin gray. Length, 3.5 mm. Florida (Mrs. A. T. Slosson), and Georgia (H. K. Morrison). One male and six females. Type No. 4091. *latipennis*, n. sp.
2. Antennal arista brown, long plumose, its base yellow; black, the first two joints of antennæ, base of the third, bases of tibiæ, first joint of front tarsi and first three joints of the others, yellow; antennæ slightly tapering toward the apex, one and one-half times as long as head, the third joint five times as long as broad; face with a

median vitta, spot near the oral margin each side of the middle, and the narrow lateral margins, whitish pruinose; front slightly polished, the broad lateral margins, except on their lower part, thinly gray pruinose; body polished, two vittæ on the mesonotum, scutellum and front part of pleura thinly gray pruinose; wings tinged with yellow. Length, 3 mm. Lake Worth, Fla. (Mrs. A. T. Slosson), and Georgia. Three males and nine females. Type No. 4092..... *facialis*, n. sp.

Antennal arista white, short plumose, its base yellow; black, the first two joints of the antennæ, base of the third, halteres, front coxæ, front femora and broad apices of the others, all tibiæ, and the middle and hind tarsi except their apices, yellow; antennæ slightly tapering toward the apex, slightly longer than the head, the third joint four times as long as wide; front and face polished, the latter whitish pruinose near the lower part of each eye; body polished, mesonotum and scutellum with a strong coppery lustre, thinly brownish pruinose; wings tinged with yellow. Length, 3.5 mm. Santa Cruz Mts., Cal. A male specimen, collected by Mr. A. Koebele. Type No. 4093..... *albiseta*, n. sp.

Genus PACHYCERINA.

Yellow, an ocellar spot, tip of antennæ, the arista, apical half of palpi and three vittæ on the mesonotum, black; antennæ almost as long as the head, slightly tapering to the tip, the third joint three and one-half times as long as wide; front and sides of face polished, middle of face thinly whitish pruinose, body polished, wings hyaline, slightly tinged with yellow. Length, 3.5 mm. St. Augustine, Fla. Two female specimens, collected by Mr. C. W. Johnson. Type No. 4094..... *clavipennis*, n. sp.

Genus TRIGONOMETOPUS.

Yellow, two vittæ on the front, four on the mesonotum, the upper side of the scutellum and the metanotum, brown, antennal arista white, with a very short pubescence; head subopaque, mesonotum and scutellum opaque, abdomen somewhat polished; wings hyaline, small and posterior crossveins bordered with brown, two circular brown spots on the last section of the third vein, the outer one almost directly in front of the posterior crossvein. Length, 3.5 mm. Colorado. A female specimen. Type No. 4095. *punctipennis*, n. sp.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR
THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF
INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 6.)

FAMILY XII.—NEMATIDÆ.

This family is very sharply separated from the *Selandriidæ*, *Dineuridæ* and the *Tenthredinidæ* by having only one marginal cell in the front wings, while from the *Hylotomidæ*, *Lophyridæ*, *Perreyiidæ* and the *Pterygophoridæ*, which also have only one marginal cell, it is readily distinguished by pteropterological and antennal characters, and especially by the basal nervure in front wings uniting with the subcostal vein far from the origin of the cubitus.

Our species have been subjected recently to a thorough revision by Mr. C. L. Marlatt, in a work entitled: "Revision of the Nematinae of North America, etc. Technical Series No. 3, U. S. Department of Agriculture, Washington, 1896."

Mr. Marlatt's "Revision" is typical of the best kind of systematic work, and the Department of Agriculture is to be congratulated on publishing works of such a high degree of merit.

The publication by our Government of technical works, on special groups of insects of an economic importance, is an excellent feature in the present administration and one that I trust will become permanent. These publications not only contribute towards filling a void in our literature, draw attention of our farmers, fruit-growers and laymen to the necessity and importance of the study of insects, but also act as a stimulant to our students, and greatly advance systematic and economic entomology.

In his revision Mr. Marlatt followed Konow and placed the genera *Dineura* and *Hemichroa* with the *Nematinae*. In this I cannot agree, since they seem to me to have very little affinity, if any, with this group. Their affinities are almost equally divided between the *Selandriidæ* and the *Tenthredinidæ*, but with characters sufficiently distinct to justify one in placing them in a family by themselves.

It may be well here also to call attention to the position Mr. Marlatt assigned one of his species, viz., *Pachynematus gregarius*. Dr. Dyar*, in describing the larva of this species, expressed surprise at the position

*Journ. N. Y. Ent. Soc., Vol. V., p. 30.

assigned the imago by Mr. Marlatt, since the larva was so different from other *Pachynematus* larvæ he had bred. He says: "I was much surprised that the flies should belong to *Pachynematus*. The larvæ of this genus are solitary grass feeders, whereas a larva very similar to this species is described as that of a species of *Pristiphora*."

On making a careful study of the type, I find it really belongs to the genus *Micronematus*, Konow, and has nothing to do with *Pachynematus*. This result was a great surprise to me, because Mr. Marlatt, in speaking of the genus *Micronematus*, says: "This genus seems to be of doubtful value, and at least has no American representative."

The genus, as my table shows, is a good one, falling near *Fristiphora*, where Dyar would have it placed from larval characters, and it is quite evident that Marlatt misinterpreted some of Konow's characters, since the genus as tabulated by him cannot be recognized.

The family *Nematidæ*, as here defined, may be divided into two subfamilies as follows:

Table of Subfamilies.

Lanceolate cell widely contracted at the middle and closed	Subfamily I., Cladinæ.
Lanceolate cell petiolate.....	Subfamily II., Nematinae.

Subfamily I.—CLADINÆ.

The species belonging to this subfamily are readily distinguishable by the widely-contracted lanceolate cell, the contracted part uniting with the submedian vein and leaving a closed cell at base.

To this group belong five genera distinguishable by the aid of the following table:

Table of Genera.

Second submarginal cell receiving both recurrent nervures.....	4.
Second and third submarginal cells each receiving a recurrent nervure, or if the first transverse cubitus is wanting it is the first and second submarginal cells which receive the recurrent nervures.	

Male characters..... 2.

Female characters.

Antennæ somewhat compressed, with a sharp projection at tip of basal joint, the third joint with a sinus beneath at the middle, so that the joint is narrower at middle than at the base or tip..... *Cladius*, Illiger.

Antennæ normal, cylindrical, not compressed, claws cleft,

- Third joint of antennæ slightly curved or slenderer at the middle, with a short projection at the base, not longer than the fourth.....Trichocampus, Hartig.
- Third joint of antennæ simple, uniformly thickened.....Priophorus, Latreille.
2. Antennæ simple, or at most with the third joint alone forked.....3.
Antennæ with joints 3-5 and sometimes 6-7 with a more or less prominent branch at apex.....Cladius, Illiger.
3. Antennæ with the third joint bent or a little slenderer at the middle, and usually with a short blunt process beneath; second recurrent nervure in hind wings interstitial or uniting with the cubitus *beyond* the second transverse cubitus. ...Trichiocampus, Hartig.
Antennæ simple, the third joint uniformly thickened; second recurrent nervure in hind wings joins the first submarginal cell *before* the second transverse cubitus.....Priophorus, Latreille.
4. Front wings with four submarginal cells; claws bifid.
♀ with the abdominal segments 7-8 not carinate; ♂ with the last abdominal segment entire, without a median furrowCamponiscus, Newman.
- Front wings with three submarginal cells (rarely with four); claws simple.
♀ with dorsal abdominal segments 7-8 with median carinæ;
♂ with the last dorsal abdominal segment with a median furrow.....Anoplonyx, Marlatt.

Subfamily II.—NEMATINÆ.

This subfamily is distinguished from the *Cladine* by the distinctly petiolated lanceolate cell, the anal vein being always absent at base; the second submarginal cell, or the first if the first transverse cubitus is wanting, always receives both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus.

About a dozen genera are known, readily distinguished by the aid of the following table:

Table of Genera.

- Costal transverse nervure interstitial with the apex of the basal nervure or placed a little beyond it.....10.
- Costal transverse nervure never interstitial with the apex of the basal nervure, always placed somewhat before it.
- Claws bifid or cleft.....5.

Claws with a small or short tooth beneath, a little beyond the middle, and which projects nearly at a right angle. 2.

Claws simple, without a tooth.

First and third submarginal cells small, nearly equal, united shorter than the second; clypeus emarginate.

Gymnonychus, Marlatt.

2. Clypeus anteriorly truncate or at most only slightly emarginate; first transverse cubitus often wanting. 3.

Clypeus anteriorly distinctly emarginate; first transverse cubitus always distinct.

Marginal cell in hind wings at apex pointed, with an appendage, the second recurrent nervure usually uniting with the first submarginal (first discal) cell, at about two-thirds its

length. Pachynematus, Konow.

3. Marginal cell in hind wings at apex pointed, *with* an appendage; head with the frontal area most frequently wanting, rarely distinct. . . . 4.

Marginal cell in hind wings pointed, *without* an appendage; head with the frontal area distinct.

Second recurrent nervure in hind wings received by the first submarginal cell at about two-thirds its length, or a little before, rarely very near its apex; last dorsal abdominal segment in ♂ with a carina extending to apex. Lygaeonematus, Konow.

4. Hind wings with the second recurrent nervure received by the first submarginal cell at about two-thirds its length or a little before, rarely beyond; frontal area wanting; sheaths of ovipositor rounded at apex; last dorsal segment in ♂ with the carina, if present, not extending to the apex. Pristiphora, Latreille.

Hind wings with the second recurrent nervure received by the first submarginal cell near its apex or almost interstitial with the second transverse cubitus; frontal area more or less defined; sheaths of ovipositor roundly truncate from below; last dorsal segment in ♂ triangularly produced. Micronematus, Konow.

5. Front wings with four submarginal cells, or if with three only the first transverse cubitus is wanting or subobsolete. 6.

Front wings with three submarginal cells, the third transverse cubitus wanting; second recurrent nervure in hind wings usually interstitial or uniting with the cubitus a little beyond the first closed submarginal cell; frontal area more or less defined. Euura, Newman.

(= Cryptocampus, Hartig.)

6. Middle mesothoracic lobe medially more or less depressed and *with* a distinct median grooved line or furrow; marginal cell in hind wings pointed at apex, but *with* a distinct appendage. 8.

Middle mesothoracic lobe convex, *without* a distinct median grooved line, with a more or less median carina posteriorly; if this groove is at all present, only slightly indicated anteriorly; marginal cell in hind wings pointed at apex, but *without* a distinct appendage.

Male characters. 7.

Female characters.

Antennæ rather widely separated at base, with a convex prominence between, which is margined superiorly; last dorsal abdominal segment short, rounded at apex. . Pontania, Costa.

7. Last dorsal abdominal segment with a small blunt, more or less awl-shaped, projection. Pontania, Costa.

8. Male characters. 9.

Female characters.

Frontal area more or less well defined; mesonotum and pleura shining, smooth, or at most sparsely punctate; last dorsal abdominal segment not long, squarely truncate or very slightly rounded at apex.

Last ventral segment at apex *without* a median sinus or incision.

Legs normal, the hind tarsi not thickened. . Pteronus, Jurine.

Legs with the hind tibiae and tarsi more or less thickened, the former longitudinally sulcate. . Holcoenema, Konow.

Last ventral segment at apex *with* a median sinus or incision. Nematus, Jurine.

Frontal area wanting; mesonotum and pleura opaque, with very dense and fine punctures; last dorsal abdominal segment almost as long as wide, at apex rounded or triangularly produced; last ventral segment triangularly produced. . Amauronematus, Konow.

9. Last ventral segment at apex obtusely, triangularly produced or truncate.

Last dorsal abdominal segment at apex medially, *with* a rounded or truncate projection. Pteronus, Jurine.

Last dorsal abdominal segment at apex truncate, *without* a projection.

First dorsal abdominal segment not deeply incised; terminal ventral plate only about twice as long as wide; frontal area more or less distinct.

Hind tibiæ and tarsi somewhat thickened, the former
with a longitudinal sulcus *Holcocnema*, Konow.

Hind tibiæ and tarsi normal *Nematus*, Jurine.

First dorsal abdominal segment with a deep median incision ;
terminal ventral plate more than twice as long as wide ;
frontal area wanting *Amauronematus*, Konow.

10. Hind femora and tibiæ somewhat thickened, the tarsi
normal *Hypolaepus*, Kirby.
Hind tibiæ towards apex and first joint of the tarsi strongly com-
pressed and very broad *Croesus*, Leach.

FAMILY XIII.—DINEURIDÆ.

This group has heretofore been classified with the *Nematidæ*, but from which it is readily separated by having two marginal cells in the front wings. It appears to me, however, to be more closely allied to the *Selandriidæ*, and especially to the *Tenthredinidæ*, than to the *Nematidæ*, and probably was evolved from the latter. The basal nervure uniting with the subcostal vein some distance from the origin of the cubitus separates it from the former, while the short oviform abdomen and the venation of the front wings distinguish it from the latter.

Two subfamilies have been recognized, separated as follows :

Table of Subfamilies.

- Lanceolate cell contracted near the middle, closed at
base Subfamily I., *Hemichroinæ*.
Lanceolate cell petiolate Subfamily II., *Dineurinæ*.

Subfamily I.—HEMICHROINÆ.

This subfamily in having the lanceolate cell contracted at or near the middle, and in the *habitus* of the species, closely resembles the *Hoplocampinæ* in the family *Selandriidæ*, and suggests the possibility of its being the phylum from whence that family originated.

The genera may be recognized with the aid of the following table :

Table of Genera.

Costal transverse nervure not interstitial, placed much before the apex of the basal nervure ; third submarginal cell more than twice as long as the first ; claws bifid.

Second submarginal cell receiving both recurrent nervures, or the second recurrent is interstitial ; first recurrent nervure in hind wings *not* twice the length of the first transverse cubitus, the anal cell longly petiolated *Hemichroa*, Curtis.

Second and third submarginal cells each receiving a recurrent nervure;
first recurrent nervure in hind wings more than twice the length of
the first transverse cubitus, the anal cell longly

petiolated *Opisthoneura*, Ashm., n. g.
(Type *O. Crevecoeuri*, Ashm.)

Costal transverse nervure interstitial with the apex of the basal nervure ;
third submarginal cell not twice as long as the first ; claws

simple *Marlattia*, Ashm., n. g.
(Type *H. laricis*, Marl.)

Subfamily II.—DINEURINÆ.

The petiolated lanceolate cell readily distinguishes this subfamily from the former. In general appearance the species included in it recall those to be found in the *Blennocampina*, the only marked structural difference being the venation in the front wings.

Only two genera are at present known, separated by the characters made use of in the following table :

Table of Genera.

Transverse radius oblique and joining the third submarginal cell *beyond*
its middle ; claws of hind legs with a small, subapical
tooth *Dineura*, Dahlbom.

Transverse radius straight and interstitial with the second transverse
cubitus, or very nearly, the latter itself being interstitial (or nearly) with
the second recurrent nervure ; claws bifid *Mesoneura*, Hartig.

THE FREEZING OF INSECTS.

BY HENRY H. LYMAN, MONTREAL.

In the 22nd Report of the Entomological Society of Ontario, being that for 1891, there appeared a paper from my pen under the title "Can Insects Survive Freezing?"

I have recently come across further records of observations upon this subject, and deem them of sufficient interest to be republished in the CANADIAN ENTOMOLOGIST.

In looking over an interesting book of travels entitled "A Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean, undertaken by order of the Hudson's Bay Company for the discovery of

copper mines, a north-west passage, etc., in the years 1769, 1770, 1771 and 1772, by Samuel Hearne," published in 1796, I came across the following interesting notes on page 397 :

"FROGS, GRUBS, AND OTHER INSECTS.

"Frogs of various colours are numerous in those parts as far north as the latitude 61°. They always frequent the margins of lakes, ponds, rivers and swamps ; and, as the winter approaches, they burrow under the moss, at a considerable distance from the water, where they remain in a frozen state till the spring. I have frequently seen them dug up with the moss (when pitching tents in winter) frozen as hard as ice, in which state the legs are as easily broken off as a pipestem, without giving the least sensation to the animal ; but by wrapping them up in warm skins, and exposing them to slow fire, they soon recover life, and the mutilated animal gains its usual activity ; but if they are permitted to freeze again, they are past all recovery, and are never more known to come to life. The same may be said of the various species of spiders, and all the grub kind, which are very numerous in those parts. I have seen thousands of them dug up with the moss when we were pitching our tents in the winter, all of which were invariably enclosed in a thick web, which Nature teaches them to spin on those occasions ; yet they were apparently all frozen as hard as ice. The spiders, if let fall from any height on a hard substance, would rebound like a gray pea ; and all the grub kind are so hard frozen as to be as easily broken as a piece of ice of the same size ; yet, when exposed to a slow heat, even in the depth of winter, they will soon come to life, and in a short time recover their usual motions."

In Dr. H. Guard Knaggs's *Lepidopterist's Guide*, on page 49 of the 1871 edition, under the heading of "Ailments of Larvæ," I find the following :

"Frost Bite. It is well known that larvæ, which have been so stiffly frozen that they might have been easily broken, have afterwards recovered. The chief thing to be remembered in the treatment of such cases, is that the thawing should be effected very gradually — rapid thawing being dangerous."

NOTES ON JASSINI, WITH SOME NEW SPECIES

BY C. F. BAKER, ALABAMA POLYTECHNIC INSTITUTE, AUBURN, ALA.

Tinobregmus vittatus, VanD.—This species occurs from Virginia to Brownsville, Texas, where it is frequent. The male differs most remarkably from the female. It is smaller and the elytra equal the abdomen in length. In the male the head and all below, with bases of femora, hind tibiae entirely and tips of elytra are black; the pronotum and elytra except tips are milky white. The hind tibiae equal the whole body in length.

Neocoelidea, G. & B.—The description of this genus requires amending somewhat, on account of the discovery of a number of new species evidently congeneric with *tumidifrons*, and in consequence of a study of a large series of specimens of the type species. The antepical cell in the wing is a monstrosity; there are two apical cells besides the costal or supernumerary, the first sometimes peduncled. All of the species are not as robust as *tumidifrons* and *lactipennis*, but resemble *Thamnotettix* in form, having longer elytra. The elytra always lack a distinct appendix and sometimes possess but three well-defined apical cells. VanDuzee's *Jassus lactipennis* belongs in this genus. *Tumidifrons* is found also in Texas.

Neocoelidea lineata, n. sp.—Female. Length 7 mm. Vertex broadly obtusely rounded. Colour pale greenish-yellow. Apex of vertex with a small black spot; the disc with a median longitudinal darkened area which extends across the pronotum, becoming gradually broader posteriorly and forking on the scutel. Elytra subhyaline, slightly obscured, somewhat darker along the internal border and at apex. Veins of wings except second sector strong and dark. Tergum with a longitudinal black band narrowing to a point behind and visible through the closed elytra. Ovipositor rufous. Last ventral segment very long and truncate or more or less sinuate behind, and slightly notched at centre.

Male.—Length 5.5 mm. Colour orange yellow. Length of valves twice entire breadth at base, alternate and parallel-sided beyond middle.

Prof. A. P. Morse collected this species in abundance at Ashland, Oreg., Sept. 7th. There were in the lot but few males to many females.

Neocoelidea obscura, n. sp.—Female. Length 5.5 mm. Proportionally rather broad across base of elytra. Vertex obtusely rounded. Straw coloured; apex of vertex with a small black spot. Elytra nearly hyaline. Tergum with a subobsolete trace of black at base. Vertex, pronotum and scutel with faint traces of two parallel light lines, which are very

faintly edged with reddish. Veins of wings, except second sector, very distinct and brownish. Last ventral segment very long, white, hind margin evenly rounded.

Male.—Length 5.5 mm. While slightly shorter, the male is not narrower, and this makes it appear more robust than the female. The reddish borders are more prominent, and the veins of the elytra are conspicuously brown, the latter being a very rare character in this genus. The valves are once and a half as long as wide at base, the sides evenly oblique to the acute tip, scarcely incurved.

There are several females in my collection from Prescott, Ariz. (Kunzé), and in the National Museum a male from Texas, and a female from Marble Valley, Cal. (Koebele).

Neocoelidea rubrolineata, n. sp.—Size and form of *obscura*, to which it is closely related. The two parallel white lines on the vertex, pronotum and scutel, are very distinct. Vertex obtuse, but rather strongly produced, its apex without a black spot. Colour above shading into reddish on the vertex, where it contrasts strongly with the white lines, giving the vertex the appearance of being rubrolineate. Inner margin of elytra somewhat darker. Wings with all the veins whitish.

Male.—Slightly smaller than the female, and brighter coloured. Valves large, long, parallel-sided, tumid, and apex bluntly rounded.

Described from one male and five females in the Herbert H. Smith collection, taken at Corumba and Chapada, Brazil, in March, April, May.

Neocoelidea pallida, n. sp.—Female. Length 5 mm. Vertex strongly produced and subacute. Colour very pale faded yellowish throughout, the elytra subhyaline. Veins of wings, except second sector basally, distinct and brownish. Last ventral segment long, subtruncate. Male somewhat smaller, valves as in *lineata*.

This species was abundant near Tucson, Ariz., in May and June (Kunzé). Prof. Morse also found it at Palm Springs, Cal., on July 12th. This small weak form seems to be common in the South-west. It has a singular lack of salient characters. It can be readily separated from the other species by its size, lack of markings, and form of vertex.

Neocoelidea modesta, n. sp.—Female. Length 7 mm. Large and robust, but with the usual elongate elytra. Pale sordid yellowish throughout, the elytra subhyaline, the vertex with a small black spot at apex. The last ventral segment is twice the length of the preceding, and very broadly notched to half its length.

Described from three females in the Herbert H. Smith collection, taken at Chapada, Brazil, in June and August.

Neocoelidea Barrettii, n. sp.—Female. Length 6 mm. Vertex moderately produced, obtuse. Colour pale lemon-yellow. Tip of vertex with a small black spot; from this, extending backward to the tip of the clavus, is a conspicuous longitudinal brown band; the sides of this band are darker, and incurved twice on the vertex, once on the pronotum, once on the scutel, and twice on the clavus; it terminates in a brown spot on either side just beyond tip of clavus. Scutel with a black spot on either side of the centre. Elytra subhyaline, slightly smoky within at tip. Wings milky white, with a median longitudinal fuliginous band. Tergum with a median longitudinal black band.

Male somewhat smaller and more strongly coloured, the valves as in *lineata*.

Described from several specimens collected near Vera Cruz, Mexico. Named in honour of Mr. O. W. Barrett, a collector who shows promise of doing something noteworthy on the Mexican fauna. This is the most striking North American species of the genus.

Neocoelidea bimaculata, n. sp.—Female. Length 6.5 mm. With the colour and very much the general appearance of *modesta*, but smaller, slenderer, and with two brown commissural spots on clavus, one at base, the other at tip. The vertex is proportionately more produced. Last ventral segment somewhat longer than preceding, depressed either side of median line, the hind margin slightly produced and minutely notched at middle.

Male slightly smaller, the valves rather large and long, gradually evenly narrowed to obtuse points.

Described from a male and female in the Herbert H. Smith collection, taken at Chapada, Brazil, in August.

Neocoelidea Smithii, n. sp.—Female. Length 8 mm. Pale yellowish with faint touches of reddish on sides of front, pronotum, scutel, and along commissural margin of clavus. Elytra shining yellowish, subhyaline, with four dark spots on inner margin, three on clavus and one beyond; with a complete transverse decoloured band before transverse nervures, which is edged before near costa with a dash of red; with another partial decoloured band beyond transverse nervures which is edged near costa with fuliginous. Costal margin of elytra and first sector of wings greenish. Wing subhyaline, with a median row of three fuliginous spots; veins pale

brown, excepting first sector. Last ventral segment but little longer than preceding, hind margin truncate, with the lateral angles somewhat produced.

Described from a single specimen from Brazil in the Herbert H. Smith collection. It is the largest and finest known species in the genus. It is most nearly related to *gratiosus*, Spang., which is also an undoubted *Neocoelidea*.

Paracoelidea, n. gen.—With the venation and other characters of *Neocoelidea*, but with the clypeus strongly and very conspicuously tuberculate. This is a character unique in the tribe *Jassini* and very rare in the subfamily *Jassinæ*. The elytra are elongate as in *Thamnotettix*. Type, *Paracoelidea tuberculata*, n. sp.

Paracoelidea tuberculata, n. sp.—Female. Length 5 mm. Vertex rather strongly produced and subacute, as in *Neocoelidea pallida*. Colour pale yellowish. The elytra subhyaline and faintly yellowish, with the internal margin and apex slightly infusate. Tergum medially black. Wing with the third sector and its forks strongly brown, the other veins pale. Last ventral segment twice length of preceding, hind margin truncate.

Male somewhat more highly coloured. The valves are about twice as long as entire breadth at base, tapering to obtuse tips, sides rounded below, somewhat constricted at two-thirds of length.

Described from several specimens from New Bedford, Mass. (Hough), several from Washington, D. C. (Coquillett), a number from the vicinity of Baltimore taken on pine (Uhler), and one female collected by myself at Auburn, Ala.

Terulia magna, n. sp.—Female. Length 14 mm, breadth across base of elytra 5 mm. Ocelli equidistant from eyes and median line. Front with a fine, sharp median carina. Clypeus with a narrow median callosity and with apex somewhat emarginate. Clavus without transverse nervures. Colour ferruginous throughout, including the subcoriaceous elytra; front a little lighter, vertex darker before tip. The strong carina on propleura, and some indistinct markings on fore and middle legs, reddish. Hind legs lineate with black. Last ventral segment depressed on either side of a strong median ridge, the hind margin acutely produced medially, then broadly incurved to the prominent lateral angles.

Described from a single female in the Herbert H. Smith collection, taken at Para, Brazil, in July. This species is nearest *ferruginea* (Stal.), but differs in size and various minor characters. It is the largest described species in the genus.

Petalopoda annulipes (Spang) —There is a specimen of this curious Jassid in the Herbert H. Smith collection, taken at Santarem, Brazil.

TWO NEW SPECIES OF LECANIUM FROM CANADA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Lecanium (Eulecanium) caryarum, n. sp. -- ♀. Scale (after producing young) somewhat variable in form, from long. 6, lat. $3\frac{1}{2}$, alt. $2\frac{2}{3}$ mm., to long. $5\frac{1}{2}$, lat. $4\frac{1}{3}$, alt. $3\frac{1}{4}$ mm., the more swollen individuals probably affected by parasites; outline in transverse section nearly hemispherical, in longitudinal section more or less low-pyramidal, with the posterior slope considerably the shortest, the apex of the pyramid marked by a more or less prominent boss, sometimes inclined to be double. Colour of scale dark chestnut; sides pitted and plicate to a variable degree.

Antennæ rather unusually long and slender, about $348\ \mu\mu$ long; formula 37 (12) 465; 3 is about $83\ \mu\mu$ long, 7 about $50\ \mu\mu$; 1 with two short bristles, 2 with two long bristles near the end, 4 with a very long bristle, 5 and 6 each with a rather short bristle, 7 with two whorls of rather short bristles.

Tarsus about $\frac{2}{3}$ length of tibia; tibia $116\ \mu\mu$ long, tarsus (without claw) about $74\ \mu\mu$. Digitules long; thorax of claw extending far beyond its tip, one a little shorter and stouter than the other. Length of anal plates about $150\ \mu\mu$. Width of mouth-parts about $166\ \mu\mu$.

Hub.—Very abundant on twigs and branches of a magnificent tree of *Carya alba*, on the grounds of Mr. C. Thonger, at Niagara, Ontario, June 17th, 1898 (J. Fletcher).

There is an unfortunate confusion about Fitch's *L. caryæ*. The original description, published in 1856, is as follows: "Large, very convex, oval, black fading to chestnut brown, in May dusted over with a white powder." Long. 0.40, lat. 0.25 inch. This agrees tolerably well in some respects with a species found by Mr. King, which will be described in a future paper.

Signoret, however, describes a quite different *L. caryæ*, based on specimens sent to him as that species by Fitch. This is only 6 mm. long, and has 6-jointed antennæ. It is closely allied in all respects to the European *L. corni*. What I take to be this species was found by Mr. G. B. King, at Methuen, Mass., on *Gleditschia*. This *Gleditschia* insect, however, agrees even better with Signoret's account of *L. cynosbati*, Fitch, and my present opinion is that *cynosbati*, Fitch, and *caryæ*, Sign. (not Fitch, 1856), are one species.

L. caryæ, var. *canadense*, Ckll, must stand as *L. canadense*. *L. caryarum*, above described, is well distinguished from all these species, especially by its antennæ.

Lecanium (Eulecanium) macluratum, n sp.—♀. Scale long. $4\frac{1}{2}$, lat. 3, alt. 3 mm., very dark chestnut brown, shiny, smooth dorsally, pitted round the margin; in transverse section narrower than a half circle, in longitudinal section with the outline of a half circle, except that the margin is produced caudally.

Antennæ shorter than in *caryarum*, about as long as in *cynosbati*, 7-jointed, formula 3 (17) 25 (46). Sometimes the antennæ seem only 6-jointed, with a formula 3 162 (45). In the normal (7-jointed) antennæ, 3 is about 62 $\mu\mu$ long, while 4 is less than half that length; 1 is about 42 $\mu\mu$ long, 7 the same.

Tibia 113 to 121 $\mu\mu$ long, tarsus (without claw) 85 to 90 $\mu\mu$, claw 23 $\mu\mu$. Claw digitules rather slender, extending considerably beyond its tip. Skin reticulated as usual in the subgenus.

Hab—On twigs of osage orange, Niagara, Ontario, June 17, 1898 (J. Fletcher).

This scale has some considerable resemblance to *L. corylifex*, Fitch, which Mr. G. B. King has lately found at Lawrence, Methuen and Andover, Mass., on *Corylus americana*.

I will take this opportunity to record that I have just received *L. quercitrionis*, Fitch, from two new localities, on new food-plants, viz., (1) on elm, DuBois, Ill. (*Chas. C. Adams*), (2) on *Castanea pumila*, on the road to and near the Yosemite Valley, Mariposa Co., Calif. (*Alex. Craw*).

TÆNIOCAMPA ALIA, GN., AT QUEBEC.

BY REV. THOMAS W. FYLES.

Fifty-nine eggs of this species were found on a twig of *Amelanchier Canadensis*, at the "Gomin," June 1st, 1897. They were laid in four rows—each row was about three-fourths of an inch long.

Egg.—Small, dull pink in colour, striated. The ridges branch into pairs a short distance from the apex, and number altogether about 33. Each ridge is regularly indented, so as somewhat to resemble a cord. Hatched in the afternoon of June 5th.

Young larva.—A half-looper. Length one-tenth of an inch. Colour greenish-yellow. Set thickly with brown warts, and sparsely with bristles.

Head large. Two hindmost pairs of pro-legs and the claspers very long. Moulded June 10th.

Larva after first moult.—Length two-tenths of an inch. Colour green. Dorsal line white; sub-dorsal white, with a chocolate line close below it. A second chocolate line below that. Side line white. On the segment next the head is a whorl of black dots, with a black bristle surmounting each dot. There is a similar whorl on the following segment. On each of the other segments there are along the back two pairs of black dots—the first pair nearer together than the second. Head ochreous. Feet green. Moulded June 15th.

Larva after second moult.—Length four-tenths of an inch. Head ochreous. Body colour dull green. Dorsal and sub-dorsal lines greenish-white. Spiracular line milk white, and broad. Between the sub-dorsal and spiracular lines the colour is brownish-green. Spiracles black. Moulded June 23rd.

Larva after third moult.—Length one inch. Head chestnut. Body colour brown. Dorsal, sub-dorsal and side lines interrupted, bluish, bordered with dark brown. Spiracular line milk white. Spiracles black. On either side of the dorsal line, on each segment, is a pale spot. Moulded June 28th.

Full-grown larva—Length one inch and a half to one inch and three-quarters. Plump; dull brown, rather mottled, lighter on the back. Dorsal, sub-dorsal and side lines somewhat interrupted; ochreous, edged with dark brown. Spiracular line dirty white. Spiracles black. Head light chestnut, with a brown spot on each side. Buried itself July 4th. Formed a cyst with a slight web.

Chrysalis.—Rich mahogany brown.

Imago.—Somewhat variable in colour. The following is a description of the prevailing type: Expanse of wings, one and a half inches; length of body, seven-tenths of an inch; length of antennæ, nine-twentieths of an inch. Antennæ filiform. Colour of primaries, brownish-ash, with a gloss; fringe reddish. Along the subterminal line to within a short distance of the costa is a row of dark brown velvety spots. Reniform and orbicular stigmata dull brown, outlined with Indian-red. Inner line wavy; this and the elbowed line are Indian-red. The central shade is reddish-brown. On the basal half of the wing are some short, curved, Indian-red markings. On either side of the subterminal line is a row of small, but distinct, brown dots. Secondaries gray. The moths appeared in early spring.

BOOK NOTICES.

OUTDOOR STUDIES: a Reading Book of Nature Study.—By James G. Needham; 1 Vol., pp. 90. New York, Cincinnati, Chicago: American Book Company.

These are a series of stories of animal life, written in a charmingly interesting way, and designed to lead on a youthful reader to observe for himself the wonders of nature that are everywhere open to his view. It begins with an account of the common wild snapdragon, or "butter and eggs," and tells how the peculiar structure of the flower is designed for the visits of the bumblebees who come for the nectar and carry off the pollen as well. The next chapters are on Chipmunks; Galls and their makers; the Golden-rod and its visitors and tenants; Crows and their doings; Dragon-flies, which, as our readers may remember, have been special objects of the author's studies; Eye-spots on insects which aid in the protection of their owners; and Ant-lions. Any boy or girl who takes up the book and dives a little way into its pages will surely read on with delight, and when the little volume is closed, be anxious to sally forth and see if he (or she) cannot find some similar marvels of nature and learn their meaning while admiring their beauty.

The book is one of a series designed for the use of school children who are about to enter the high schools. It is beautifully illustrated with about ninety wood-cuts, the work of Mrs. Needham, the author's wife, and is provided with an index and a list of the scientific names of the animals and plants referred to in the text.

LEPIDOPTERA, RHOPALOCERES AND HETEROCERES, indigenous and exotic. Supplement No. 1. By Herman Strecker. (Printed for the author), Reading, Pa., 1898. 12 pp., 4to. Price, 25 cents.

It is now twenty-one years since Mr. Strecker published the last number of the above-named work; it was, therefore, an agreeable surprise to receive the first part of a new issue with the old familiar title page. This "Supplement No. 1" contains descriptions of fifty-one species of Heterocera, which have all, with one exception—a species from Brazil—been taken in North America; two-thirds of them are described from single examples. The author states in his preface that he found, on rearranging his collection of Noctuidæ, that he had a number of specimens which he was unable to identify, "either through the bibliography, or the examination of other collections, or by the aid of specialists," and consequently he took the matter in his own hands and issued this instalment of new descriptions. He explains also the difficulties that he met with in his endeavor to give figures of the species thus described, and how he was compelled to do without them. We certainly miss them very much, but as we are never likely to possess duplicates of anything that is unique in Mr. Strecker's collection, the want of them is not so serious. Under these circumstances it seems a pity that Mr. Strecker had not sent his descriptions to some entomological journal, such as the *Transactions Am. Ent. Society*, rather than to have published them in this form himself.

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ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-fifth annual meeting of the Society was held in Montreal on the 8th and 9th of November, in order that the members might join in the celebration of the twenty-fifth anniversary of the foundation of the Montreal Branch. A full account of the business transacted and the papers read will be published in the annual report of the Society. A very enjoyable conversazione was held in the rooms of the Natural History Museum in the evening of the 8th. Short addresses on the history and progress of the Society were made by Mr. Lyman (the President), Dr. Fletcher, and the Rev. Drs. Bethune and Fyles. A large number of microscopes, with slides of an entomological character, were furnished by the Microscopical Society, and a splendid display of specimens, chiefly Lepidoptera, was made by the members of the Montreal Branch.

The following were elected officers for the ensuing year :

President.—Henry H. Lyman, M. A., Montreal.

Vice-President.—Rev. T. W. Fyles, D. C. L., F. L. S., South Quebec.

Secretary.—W. E. Saunders, London.

Treasurer.—J. A. Balkwill, London.

Directors.—Division No. 1—W. H. Harrington, F. R. S. C., Ottawa ; Division No. 2—J. D. Evans, Trenton ; Division No. 3—Arthur Gibson, Toronto ; Division No. 4—A. H. Kilman, Ridgeway ; Division No. 5—R. W. Rennie, London.

Directors Ex-officio (ex-Presidents of the Society).—Professor Wm. Saunders, LL. D., F. R. S. C., F. L. S., Director of the Experimental Farms, Ottawa ; Rev. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Headmaster of Trinity College School, Port Hope ; James Fletcher, LL. D., F. R. S. C., F. L. S., Entomologist and Botanist, Experimental Farms, Ottawa ; John Dearness, I. P. S., London.

Director Ex-officio (Ontario Agricultural College).—Professor Wm. Lochhead, Guelph.

Librarian and Curator.—J. Alston Moffat, London.

Auditors.—J. H. Bowman and W. H. Hamilton, London.

Editor of the Canadian Entomologist.—Rev. Dr. Bethune, Port Hope.

Editing Committee.—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; James White, Snelgrove.

Delegate to the Royal Society.—Rev. Dr. Fyles, South Quebec.

Delegates to the Western Fair.—J. Dearness and W. E. Saunders, London.

Committee on Field Days.—Dr. Woolverton, Messrs. Balkwill, Bowman, Elliott, Law, Percival, Rennie, Saunders, and Spencer, London; Dr. Hotson, Parkhill.

Library and Rooms Committee.—Messrs. Balkwill, Bethune, Dearness, Moffat, and Saunders.

NOTES ON SOME ALBERTA BUTTERFLIES.

BY F. H. WOLLEY DOD, CALGARY, ALBERTA.

Chionobas.—To hear of the occurrence of *Chionobas Macounii* in the hill-prairie district south of Calgary* will doubtless be as much of a surprise to most entomologists as the discovery of it here has been to myself. That a man who, like myself, is ever on the outlook for anything fresh in the way of butterflies, should have lived for five years in a *Macounii* locality without knowing it surpasses my comprehension. Whilst overhauling, relaxing, and setting last winter from the captures of the past two seasons, I came across, amongst some papered specimens that had been handed to me by a Mr. Hudson, an ardent collector here, a papered butterfly labelled "*Chionobas Chryxus*, ♀, July 4th, 1896," taken amongst the spruce about twelve miles west of here; that is to say, about 26 miles to the south-west of Calgary. Now, though I have never yet seen *Chryxus* here, I have always been expecting to come across it amongst the spruce, and was not much surprised. However, after relaxing and setting the specimen, lo and behold! it was not *Chryxus*, but agreed rather closely with some *C. californica* ♂♂ that I have from Ft. Klamoth, Oregon. Having learnt from Mr. Elwes's "Revision of *Ceneis*" that a supposed *Macounii* ♀ had been taken by Prof. Macoun

* A fine male of this species taken at Red Deer, N.-W. T., by Mr. T. N. Willing, of Olds, Alta., was shown at the annual meeting of the Entomological Society of Ontario in 1895.

at Morley*, Alta., my suspicions were aroused, as the locality where Mr. Hudson took the specimen is very like the Morley district, viz., thick spruce and pine timber. To make sure whether the species was *Macounii* or not, of course, needed a ♂, so I determined to visit the locality this season and work specially for it. On June 18th of this year Mr. Hudson brought me a fine ♂ of the same species that he had just captured about a mile west of my place (*i. e.*, about ten miles east of the eastern limit of the spruce here), and which, from its resemblance in size and colour to my Oregon *Californica*, except for the absence of sex mark, I had not the slightest doubt was *Macounii* from the moment I saw it. I am generally too busy with other matters to devote more than one day in the week to butterfly catching, and as the spruce district is a far better hunting-ground for various species than the more immediate neighborhood, it is thither that about once a week I generally wend my way. Accordingly, on June 19th, Mr. Hudson and myself visited last year's locality together, and succeeded in capturing, amongst other species, one fine ♂ *Macounii* flying in the thick timber in company with *Jutta*. On 26th we took two ♂♂ and two ♀♀ in the same locality, and saw about two more, and noted the fact that it is less partial to the thick spruce than *Jutta*, as three of the four specimens were taken outside the spruce, one several hundred yards from it, whilst *Jutta*, though common under cover of the woods, is seldom seen outside. The capture by myself on July 4th of a ♀ in fair condition, on the hill-prairie about two miles east of where Mr. Hudson first took it this year, brings me to believe that it must be somewhat widely distributed, though it is certainly far from common. Up to date we have turned up nine specimens in all, and only seen about two more. I can recognize it on the wing at a glance, and its flight being slow and somewhat clumsy, it is very easy to net on open ground. Three of the four specimens which I caught myself near the spruce, I disturbed from dead boughs lying on the ground. One of these I followed—I cannot say chased—laboriously over fallen timber for about a hundred yards, the butterfly every now and then settling on a log, and resting with closed wings and a tilt to one side at an angle of about 45° to the log. It allowed me every time to come almost within striking distance before it took wing again, and had the nature of the ground permitted me to run a yard it would never have settled twice after I had first seen it. After one

* There is no doubt as to the identity of the specimens taken at Morley and referred to by Mr. Elwes. There were two males and one female. These were taken by Mr. W. T. Macoun, and were exhibited by Dr. Fletcher at one of our annual meetings.

or two stalkings, it flew when rising, apparently from clumsiness, toward me instead of away, and thus ended its career. The specimen I took off the prairie I observed settle on a flower-head—of what species I know not—a habit I have never yet observed in either *Jutta*, *Alberta* or *Varuna*. The ♂♂ agree fairly well with my *Californica*, except that both primaries and secondaries are broader and more rounded, the sex marks absent, and the primaries have two ocelli, rarely a trace of a third, whereas my *Californica* have only one; and the ground colour of the under side of secondaries is paler, and the band more contrasting. My only explanation of the fact that I have not met with it here before this year, is that it must be very erratic in appearance, as so conspicuous a butterfly is not easily overlooked. I should be glad to hear something about it from those who have taken it at Nepigon.

A NEW PLANT LOUSE ON TOBACCO.

BY THEODORE PERGANDE, WASHINGTON, D. C.

Dr. L. O. Howard, who is preparing a general article on the subject of insects affecting tobacco, for the Year Book of the U. S. Department of Agriculture for 1898, has called my attention to a plant louse feeding upon tobacco plants grown on the grounds of the Department, which he wishes to mention specifically in his article, and since it is a new species, at his request, I submit for publication the following description.

I had been familiar with this undescribed species since 1897, and had found it on the grounds of the Department of Agriculture in smaller colonies on *Rumex crispus*, *Leucanthemum vulgare*, *Forsythia viridis-sima*, and also on the leaves of the apple, pear, and egg-plant. Specimens have also been received from Mt. Holly, Md., where they were reported to feed in immense numbers on the tomato plant.

NECTAROPHORA TABACI, new species.

Winged Viviparous Female.—Length of body, 2.8 mm. to 3 mm.; expanse of wings, about 8 mm.; length of antennæ, 3 to 4 mm. Colour yellowish-green and faintly pruinous, with the median line and lateral margins of the abdomen more or less distinctly darker. Head, thoracic lobes and sternal plate light brownish and polished; the anterior angle of the median lobe and posterior angle of the scutellum frequently black. Eyes brown; ocelli colourless, margined at inner side with black. Antennæ black, reaching considerably beyond the tip of the tail, the two basal joints pale, dusky or with a greenish tinge, extreme base of third

joint pale greenish. Legs rather long and slender; femora pale greenish at base, shading gradually from brown to black at the apex; coxæ pale greenish; tibiæ dark yellowish, their apex and the tarsi black. Nectaries long and slender, slightly stoutest at base, about two-thirds the length of the femora, reaching beyond the tip of the tail, and of a black colour, with their basal fourth or less, pale greenish. Tail about one-fourth the length of the nectaries, curved upwards, densely covered with minute spines, and provided with a few rather long and fine hairs along the edges; green, changing gradually to dusky towards the end. Rostrum short, not reaching to the median coxæ, pale dirty yellowish, the last two joints brown or black. Wings transparent, iridescent; the subcosta faintly yellowish or greenish, its base more or less distinctly yellow; stigma pale greenish, and with a pale dusky shading along the outer and inner margin; costa and veins slender and black.

The antennæ are apparently without any sensoria, but are provided with a few short and capitate sensorial hairs; those of the tibiæ are quite numerous and slightly enlarged at the tip.

Apterous Female.—Length, 4 to 4.4 mm. to the tip of the tail. Coloration as in the winged form, though more distinctly pruinous; head yellowish; coxæ and femora pale bluish-green, their apex black; tail pale green or frequently yellowish. Hairs of antennæ and legs as in the winged form. The larvæ, and especially the pupæ, are distinctly pruinous, giving to them a whitish appearance in a certain light. The younger larvæ are yellowish, with antennal joints three and four white, tipped with black. Pupæ pale yellowish-green, head and thorax pale greenish, the wing-pads almost white, and with a dusky streak near inner edge; coloration of antennæ as in the larvæ; femora very pale greenish, the tibiæ pale yellowish, with the apex black.

THE HESSIAN FLY ATTACKING TIMOTHY.

When examining some stems of timothy grass taken from a wheat field in Prince Edward Island, where this year's crop had been badly infested with Hessian Fly, I found two of the stems of timothy which bore the undoubted flax-seed-like puparia of the Hessian Fly. There was only a single puparium on each stem, and these were at the second joint from the root, lying inside the sheathing base of the leaf close above the knot. The Hessian Fly is recorded as attacking timothy in Russia, but I do not recall any record of similar work in America.

J. FLETCHER, Ottawa.

SOME NEW NEMATIDS.

BY C. L. MARLATT, WASHINGTON, D. C.

PONTANIA CONSORS, new species.

Larva and Galls.—Dyar, Jour. N. Y. Ent. Soc., VI., June, 1898, p. 121.

Female.—Length, 4.5–5. mm.; slender; surface shining, not at all pubescent; clypeus distinctly emarginate, lobes triangular; ocellar bases distinctly defined, but with walls rounded; crest rather sharp, unbroken; fovea oval, distinctly defined; antennæ short, joints 3 and 4 subequal; sheath moderately broad, regularly rounded at tip; clothed with a rather dense fringe of long brownish hairs; cerci narrow and elongate; claws deeply cleft, rays subequal; venation normal, upper discal cell of hind wings elongate, as long as or exceeding lower. Colour black; orbits and face brownish-yellow, including the area between the bases of the antennæ; pronotum, tegulæ and legs for the most part and venter of abdomen yellowish or resinous; bases of coxæ black; posterior tarsi strongly infuscated; sheath dark brown; apical half of abdomen, dorsally, resinous, more or less infuscated; veins and stigma dark brown or strongly infuscated; wings hyaline, or nearly so.

Male.—Length, 4.5 mm.; structural characters in general as in female; antennæ rather more robust, short, scarcely as long as head and thorax; upper discal cell of hind wings distinctly elongate and exceeding lower cell in length. Colour in general as in female; wing veins darker, almost black, and dorsum of abdomen altogether black; procidentia not longer than wide.

Described from one female and two males reared by Mr. Dyar from willow galls on *Salix sericea*. In the table of the genus given in my Revision of the Nematinae (Bull. 3, Tech. Ser., Div. Ent. U. S. Dept.) the female of this species would fall next to *pisum*, Walsh, from which *consors* is readily distinguished by having a somewhat elongate third cubital cell, and by the elongate upper discal cell in the hind wings. The male of this species falls in the table next to *pomum*, from which it is readily separated by the long upper discal cell in *consors* much exceeding lower cell.

PONTANIA BOREALIS, new species.

Larva and Galls.—Dyar, Journ. N. Y. Ent. Soc., VI., June, 1898, p. 121.

Female.—Length, 4 mm.; rather slender, glistening; body clothed with minute yellowish hairs, particularly evident on thorax; clypeus deeply emarginate; ridges about anterior ocellus rounded, nearly obsolete;

Sternal crest well developed, not broken; fovea minute, oval; antennæ short, much shorter than head and thorax; joints subequal; sheath narrow, elongate, regularly tapering or slightly excavated beneath, clothed with short black hairs; cerci long and narrow and not extending to the tip of sheath; claws evenly notched or nearly so; upper middle cell of hind wings projecting one-third its length beyond lower cell; venation otherwise normal. Colour black; narrow inner orbits and cheeks resinous, strongly infusate; spot between bases of antennæ; mouth-parts generally, pronotum, tegulæ, legs for the most part, and the central area of venter of abdomen resinous infusate; bases of coxæ darker, and tarsi, especially posterior pair, more strongly infusate than the rest of the legs; sheath edged with black; veins brown; stigma and costa distinctly infusate; general surface of wings somewhat infusate.

Described from two females reared by Mr. Dyar from galls on *Salix sericea*. The species is allied to *P.-californica*.

Type No. 3859, U. S. N. M.

PTERONUS CARPINI, new species.

Larva.—Dyar, Journ. N. Y. Ent. Soc., VI., June, 1898, p. 121.

Female.—Length, 6 mm.; rather robust, shining; clypeus very broadly and shallowly emarginate, nearly truncate; vertex roughened with coarse punctures; ocellar basin distinctly defined, with prominent walls; crest strongly bent anteriorly, scarcely broken centrally; fovea triangular, deep, with sharp limiting ridges; antennæ long, very strongly tapering, joints 3 and 4 subequal, 5 scarcely shorter; sheath short, rounded at tip, slightly emarginate beneath, clothed with dark brownish hairs; claws deeply notched, rays subequal; venation normal, upper cell of hind wings slightly exceeding the lower cell, stigma very robust. Colour black: small triangle below the antennal fovea, the clypeus and other mouth-parts, pronotum, tegulæ, legs for the most part, large sternal spot, and the venter of the abdomen light resinous yellow; posterior legs with the tips of their femora and tips of tibiæ and all the tarsi black; edge of the abdomen dorsally and a central line, interrupted on the first and last segments, yellow; wings hyaline, veins and stigma dark brown.

Described from a specimen reared by Mr. Dyar from gregarious larvæ on "ironwood," either *Ostrya virginica* or *Carpinus carolina*; taken at Fort Lee, N. J., in September. In the table of species (l. c., p. 45) *P. carpin*i will follow *P. thoracicus*.

Type No. 3859, U. S. N. M.

PTERONUS QUERCUS, Marlatt.

Male.—Length, 4.5 mm.; rather robust; structurally as in the female except that the intercostal nervure is not interstitial (nor is it quite so in the companion female); procidentia inconspicuous. Colour as in female,

except that the antennæ are light yellowish beneath, much more distinctly so than in the case of the other sex.

The female of this species was described in my Revision of the Nematineæ of North America (Bulletin No. 3, technical series, U. S. Dept. Agr., Div. Ent., p. 67, No. 35), from a specimen bred March 22nd, from an oak larva taken at Ithaca, N. Y., by Mr. Trelease. Mr. Dyar has handed me two specimens, a male and female, reared from solitary larvae taken at Brook Haven, L. I., resting on the edges of the leaves of *Quercus alba*, the adults issuing April 15th, 1898. Opportunity is now taken to characterize the male insect.

Type No. 386b, U. S. N. M.

NEMATUS CHLOREUS, Norton.

Male.—Length, 4 mm.; moderately robust and shining; clypeus distinctly and broadly emarginate, lateral lobes small, sharp pointed; vertex smooth, with the walls of ocellar basin indistinct or subobsolete, and the frontal crest scarcely raised; fovea semicircular, distinctly defined; antennæ short, robust, joint 3 slightly larger than joints 4 and 5; procidentia short, scarcely projecting; claws deeply notched; venation normal. Colour in general black; face, beginning with the frontal crest and including the cheeks and orbits (interrupted opposite ocelli), pallid; pronotum, tegulæ and venter for the most part, light resinous, inclined to reddish yellow; line across the middle and the upper and posterior edge of meso-epimera black; base of posterior coxæ black; tarsi, especially posterior pair, slightly infuscated; wings hyaline; veins light brown; costa and stigma yellowish, nearly hyaline.

The female of this insect was described in my Revision of the Nematineæ of North America (l. c., p. 90), from two specimens collected in Texas. Mr. Dyar has recently reared a male and female of this species from solitary edge-feeding larvae taken on black oak (*Quercus coccinea*) at Bellport, L. I., and the male is now characterized. (See description of larva, Journ. N. Y. Ent. Soc., Vol. VI., June, 1898, p. 123.)

Type No. 386i, U. S. N. M.

Papilio brevicauda, Saunders.—This rare butterfly, which has hitherto only been recorded from Newfoundland, Anticosti, Labrador, Gaspè, and a few other localities on the Bay of Chaleur, has now been found at Kamouraska, a village about eighty-five miles below Quebec, by Mr. A. F. Winn, of Montreal. He found the larvae feeding upon the leaves of *Archangelica*, and also obtained eggs from the female butterflies. The insect has now been carried through all its stages, as related by Mr. Winn in the paper he read at the annual meeting of the Entomological Society of Ontario in Montreal. This paper will be published in the forthcoming Annual Report.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF
INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 7.—Conclusion.)

FAMILY XIV.—TENTHREDINIDÆ.

This family is probably the most extensive of any of the families of the sawflies, and is of world-wide distribution, representatives of it being found in all parts of the world, although, as a whole, it is more numerous represented in the Palearctic and Neotropical regions than elsewhere.

I have separated the family into four subfamilies, distinguishable by characters made use of in the following table :

Table of Subfamilies.

Lanceolate cell contracted before the middle, but still *open*, the contracted part not quite extending to or uniting with the submedian vein, and with or without an oblique or straight cross-nervure beyond the middle.

Front wings with *three* submarginal cells.

Third transverse cubitus wanting, the first and second submarginal cells each receiving a recurrent nervure.....Subfamily I., Athlophorinæ.

Second transverse cubitus wanting, the second submarginal cell therefore large and receiving both recurrent nervures.....Subfamily II., Dolerinæ.

First transverse cubitus wanting, the first and third submarginal cells each receiving a recurrent nervure.....Subfamily III., Strongylogasterinæ (pars).

Front wings with *four* submarginal cells, the second and third each receiving a recurrent nervure..Subfamily III., Strongylogasterinæ.

Lanceolate cell with a straight or oblique cross-nervure at or a little before the middle ; if contracted, *closed*, the contracted part extending to and uniting with the submedian vein ; front wings with four submarginal cells.....Subfamily IV., Tenthredininæ.

Subfamily I.—ATHLOPHORINÆ.

This subfamily is based upon the genus *Athlophorus*, Burmeister, described in 1847, from Java. It is unknown to me in nature, but is

so admirably described and figured by Burmeister, that I have no hesitancy in considering it a distinct group near the *Dolerina*.

The venation of the front wings is quite different from the other subfamilies, in lacking the third transverse cubital nervure and in the shape of the mandibles.

This group is evidently peculiar to the Oriental region, and we may naturally expect the discovery of other genera in it when the sawflies of that region are more extensively collected, since at present our knowledge of them is most meagre.

The single genus known may be briefly characterized as follows :
Hind wings without a closed discal cell, the anal cell a little shorter than the submedian ; right mandible simple, acute ; left mandible acute at apex, but with an incision or tooth at the middle within ; claws cleft.....Athlophorus, Burmeister.

Subfamily II.—DOLERINÆ.

This subfamily was first separated as a tribe by S. C. Thomson, in 1871, with one genus, *Dolerus*, Jurine, established in 1807. Pastor Konow, however, in 1890, separated this genus into two distinct genera, based upon the shape of the eyes and the length of the malar space. An examination of a large series of species of *Dolerus* shows that these characters are scarcely reliable or always to be depended upon for separating the genera, the length of the malar space being variable in the same species, while the shape of the eyes merges gradually from a short oval to a long oval. I am, however, not yet prepared to reject the new genus *Loderus*, Konow, and give below the characters made use of by him for separating the two genera.

Table of Genera.

Three submarginal cells, the second long, receiving both recurrent nervures.

Eyes oval or rounded and strongly convex ; malar space as long or longer than the pedicel.....*Dolerus*, Jurine.

Eyes long-oval, slightly emarginate within ; malar space very short, linear, shorter than the pedicel.....*Loderus*, Konow.

Subfamily III.—STRONGYLOGASTERINÆ.

This group or subfamily has been heretofore confused with the *Selandriides*, possibly on account of the similarity of neururation. To me, however, the genera here brought together under the above subfamily

name have very little real affinity with that family. On the contrary, taking into consideration their larval characteristics, their narrow elongate shape, and especially the shape of the head, I believe them to be genuine Tenthredinids, sufficiently differentiated from the original type to form a natural group by themselves, although not yet sufficiently divergent to be considered a distinct family. This group may be the phylum from whence originated the Selandriidæ.

The genera are very numerous, but may be recognized with the aid of the following table :

Table of Genera.

Lanceolate cell with a transverse or oblique nervure between the contraction and the apex. 3.
Lanceolate cell without such a cross-nervure, simply contracted but still open before the middle.

Hind wings with two discal cells ; front wings with four submarginal cells.

Third joint of antennæ usually longer than the fourth or of an equal length. 2.

Third joint of antennæ not longer than the fourth, usually a little shorter ; claws simple.

Anal cell in hind wings much shorter than the submedian ; sheaths usually triemarginate at apex. . . Thinax, Konow.

2. Head with the frontal area well defined, enclosing the front ocellus ; anal cell in hind wings a little shorter than the submedian, briefly petiolated ; antennæ slender, the first joint shorter than the second ; claws with a strong tooth at base. . Stromboceras, Konow.

Head with the frontal area wanting or subobsolete ; anal cell in hind wings as long as the submedian.

Antennæ shorter, thicker, less distinctly pilose, the scape short, scarcely or rarely thicker than the pedicel ; third joint scarcely longer than the fourth ; claws

bifid. Strongylogaster, Dahlbom.

Antennæ long, pilose, tapering off toward tips, the scape large, much thicker than the pedicel ; third joint almost as long as joints 4-5 united. Waldheimia, Brullé.

3. Front wings with three submarginal cells. 12.
Front wings with four submarginal cells.

- Eyes not extending to base of mandibles, the malar space therefore distinct, as long or longer than the pedicel9.
- Eyes extending to base of mandibles, or very nearly; lanceolate cell with an oblique cross-nervure, very rarely with a straight or perpendicular cross-nervure.
- Hind wings with two discal cells.....7.
- Hind wings with one discal cell.....6.
- Hind wings without a discal cell.....4.
4. Hind wings normal, without a bordering nervure at apex.....5.
- Hind wings with a bordering nervure at apex, although occasionally wanting between the radius and the cubitus.
- Bordering nervure wanting at apical cell between the radius and cubitus; head and thorax coarsely cribrately punctate, opaque; antennæ rather short, stout, not tapering towards apex. ♂ *Pseudosiobla*, Ashm., n. g.
(Type *S. excavata*, Nort.)
- Bordering nervure entire; head and thorax smooth, shining, at the most sparsely punctate, except sometimes the head anteriorly; antennæ neither short nor stout, tapering toward tips, the third joint longer than the fourth; claws cleft.
- Anal cell in hind wings as long as the submedian; flagellar joints cylindrical. ♂ .. *Strongylogastroidea*, Ashm., n. g.
(Type *S. apicalis*, Say.)
- Anal cell in hind wings a little longer than the submedian; flagellar joints sub-compressed.
- ♂ *Dimorphopteryx*, Ashm., n. g.
(Type *S. pinguis*, Say.)
5. Anal cell in hind wings as long as or longer than the submedian; clypeus deeply semicircularly emarginate; claws cleft.
- Transverse median nervure uniting with the median vein at the middle of the first discoidal cell; third antennal joint not quite as long as joints 4-5 united; hind tarsi not longer than their tibiæ *Parasiobla*, Ashm., n. g.
(Type *S. rufocinctus*, Nort.)
- Transverse median nervure uniting with the median vein much before the middle of the first discoidal cell; third antennal

joint longer than 4-5 united; hind tarsi much longer than their tibiae.....Allomorpha, Cameron.*

Anal cell in hind wings shorter than the submedian, briefly petiolate; claws bifid.

Head and thorax coarsely cribrately punctate; third antennal joint as long as joints 4-5 united. ♀...Pseudosiobla, Ashm., n. g.

Head and thorax not cribrately punctate, shining; third antennal joint scarcely longer than the

fourth.....Aomodyctium, Ashm., n. g.

6. Anal cell in hind wings not so long as the submedian, briefly petiolate, the second discoidal cell present; no closed submarginal cell.

Head and thorax coarsely cribrately punctate, opaque; antennæ rather short, stout, not tapering off at tips.

♀.....Pseudosiobla Ashm., n. g.
(Type *S. excavata*, Nort.)

Anal cell in hind wings a little longer than the submedian, a closed submarginal cell as well as the second discoidal cell present.

Head and thorax not cribrately punctate, shining; antennæ tapering toward tips, the third joint long but shorter than joints 4-5 united. ♀.....Parasiobla, Ashm., n. g.

(Type *P. bicolor*, Ashm.)

7. Anal cell in hind wings shorter than the submedian, briefly petiolate.....8.

Anal cell in hind wings as long or a little longer than the submedian cell.

Lanceolate cell with an oblique cross-nervure; claws cleft.

Clypeus large and deeply semicircularly emarginate.

Second joint of hind tarsi one fourth the length of the basal joint; pedicel annular, wider than long.

♀.....Dimorphopteryx, Ashm., n. g.

Second joint of hind tarsi one-third the length of the basal joint; pedicel not annular, fully twice

**Allomorpha* may be wrongly placed in my table. Cameron says nothing about the venation of the hind wings. His description reads, "Alar neurulation resembles *Strongylogaster* (Cingulatus group)." Now, *S. cingulatus* has two discal cells in the hind wings. Kirby, however, who, I believe, examined the type, says: "*Hind wings with one discal cell.*" The artist, however, employed by Kirby has figured it on Plate X., No. 22, without a cell in the hind wings! In my perplexity I have followed the artist, since I find his figures of sawflies known to me perfectly accurate.

as long as wide or still longer.

♀ Strongylogastroidea, Ashm., n. g.
(Type *S. apicalis*, Say.)

Clypeus truncate. ♂ Siobla, Cameron.
(Type *S. mooreana*, Cam.)

8. Claws bifid or cleft.

Clypeus small, truncate or at the most sub-emarginate anteriorly.

♀ Siobla, Cameron.

Claws simple or with a minute tooth at base; clypeus distinctly emarginate; head with the frontal area well developed, enclosing the front ocellus; third antennal joint longer than the fourth. ♀ Stromboceras, Konow.

9. Hind wings with two discal cells. 11.

Hind wings without a discal cell. 10.

10. Anal cell in hind wings shorter than the submedian, usually briefly petiolated.

Marginal cell in hind wings at apex subacute, *with* a short appendage, the recurrent nervure originating far before the transverse median nervure; claws cleft or with a long tooth at base. Aphilodactium, Ashm., n. g.
(Type *S. rubripes*.)

Marginal cell in hind wings at apex rounded, *without* an appendage, the recurrent nervure originating just before the transverse median nervure; claws with a triangular median or basal tooth. Taxonus, Hartig.

11. Wings elongate, narrowed; hind tibiae very long, nearly twice the length of their femora; anal cell in hind wings shorter than the submedian; claws bifid; clypeus triangularly emarginate anteriorly. Rhoptroceros, Konow.

Wings normal; hind tibiae not nearly twice as long as their femora; anal cell in hind wings fully as long as the submedian.

Transverse nervure in anal cell straight, perpendicular; claws with a median tooth; head coarsely punctate, opaque, without a frontal area; clypeus triangularly emarginate; third and fourth antennal joints equal. Polystichophagus, Ashm., n. g.
(Type *S. filicis*, Klug.)

Transverse nervure in anal cell oblique; claws cleft or simple.
Clypeus semicircularly emarginated; frontal area poorly

- defined ; third antennal joint longer than the fourth ;
claws cleft..... *Hypotaxonus*, Ashm., n. g.
(Type *T. pallipes*, Say.)
- Clypeus truncate anteriorly or at most sub-emarginated ;
frontal area distinct, enclosing the front ocellus ; third
antennal joint not longer than the fourth ; claws
simple..... *Hemitaxonus*, Ashm., n. g.
(Type *T. dubitatus*, Nort.)
12. Hind wings without a discal cell... 14.
Hind wings with one discal cell..... 13.
Hind wings with two discal cells ; anal cell in hind wings a little
shorter than the submedian, briefly petiolated.. *Heptamelus*, Haliday.
(= *Cænoneura*, Thoms.)
13. Anal cell in hind wings a little shorter than the submedian, briefly
petiolated ; claws cleft or bifid.
Abdomen depressed, ovate ; first submarginal cell much longer
than the second ; antennæ long, the flagellum sub-
compressed..... *Harpiphorus*, Hartig.
Abdomen more or less compressed, strongly constricted
beyond the base ; first submarginal cell not or scarcely longer
than the second ; antennæ short, slender, thickened beyond
the middle..... *Emphytoides*, Konow.
14. Anal cell in hind wings shorter than the median ; clypeus anteriorly
sub-emarginated ; claws with a small tooth at base. *Emphytus*, Klug.

Subfamily IV.—TENTHREDININÆ.

This subfamily is probably the most extensive one in the family, there being several hundred species already described, the majority of which are found in the Palearctic and Neotropical regions. The subfamily is easily recognized by the lanceolate cell in the front wings, which is either contracted before the middle and *closed*, or divided into two parts by a straight or an oblique nerve.

Two of the described genera, viz., *Parabia*, Somenow, and *Cocosyndia*, Kirby (= *Pampholyx*, Freymuth), I have been unable to place in my tables, not being able to obtain specimens, nor to consult the descriptions.

Pampholyx, Freymuth, was changed to *Cocosyndia* by Kirby on account of the former name being preoccupied ; but he gives no description of it, merely stating that it is the only wingless sawfly known. I have

4. Hind wings with a surrounding nervure at apex. ♂ ..Perineura, Hartig.
5. Malar space wanting or very narrow, linear, always shorter than the pedicel.6.
Malar space distinct, as long or longer than the pedicel or second joint of antennæ,10.
6. Lanceolate cell with an oblique cross-nervure.....9.
Lanceolate cell with a short, straight or perpendicular cross-nervure.
Hind wings without a discal cell.....8.
Hind wings with one discal cell.....7.
Hind wings with two discal cells.
Anal cell in hind wings as long as the submedian.
♀Tenthredopsis, Costa.
Anal cell in hind wings a little shorter than the submedian.
Head and thorax cribrately punctate; antennæ short,
not tapering at tips. ♀Sciopteryx, Stephens.
Head and thorax smooth, shining, at the most sparsely
punctate; antennæ not short, tapering toward tips.
♂Rhogogastera, Konow.
7. Hind wings with a surrounding nervure at apex, the anal cell a little shorter than the submedian. ♂Tenthredopsis, Costa.
Hind wings without a surrounding cell at apex, the anal cell a little shorter than the submedian. ♂Amestasteiga, Costa.
8. Hind wings with a surrounding nervure at apex, the anal cell as long as the submedian. ♂ .
* Hind wings without a surrounding nervure at apex.
Anal cell as long as the submedian. ♂ ...Homœoneura, Ashm., n.g.
(Type P. delta, Prov.)
Anal cell shorter than the submedian. ♀ ..Rhogogastera, Konow.
9. Hind wings with two discal cells, the anal cell shorter than the submedian.....Pachyprotasis, Hartig.
Hind wings with one discal cell, the anal cell as long as the submedian.....Beleses, Cameron.
10. Hind wings with two discal cells.....11.
Hind wings with one discal cell.....14.
Hind wings without a discal cell.....15.
11. Wings not narrowed, the transverse radius not or rarely strongly curved.....12.

Wings narrowed, the transverse radius strongly curved; lanceolate cell long and narrow, with a short cross-nervure; anal cell in hind wings as long as the submedian; head quadrate; antennæ long and slender, the third joint a little shorter than the fourth, the following gradually shortening, the second with a small tooth within at apex. Dipteromorpha, Kirby.

12. Hind coxæ normal, the femora not or rarely extending to the tip of the abdomen. 13.

Hind coxæ much lengthened, so that the femora extend to or beyond the tip of the abdomen; lanceolate cell with a short straight nervure (or shortly contracted); anal cell in hind wings shorter than the submedian Macrophya, Dahlb.
(= Emilia, Costa.)

13. Frons on each side above the antennæ elevated into more or less distinct ridges and with deep furrows on either side; antennæ 9-jointed, filiform, slender toward tips, the third joint never longer than joints 4-5 united; anal cell as long as the submedian Tenthredo, Linné.

Frons on each side above the antennæ truncate, or feebly emarginate and without or with only a feeble furrow between the antennæ; antennæ usually more or less thickened before apex.

Antennæ 8-jointed Labidia, Prov.

Antennæ 9-jointed.

Anal cell in hind wings shorter than the submedian.

Clypeus subemarginate; antennæ long, slender, tapering off at tips, the third joint much longer than fourth, but shorter than 4-5 united.

♀ Tenthredopsis, Costa.
(? = Parastatus, Kirby.)

Clypeus deeply semicircularly emarginate; antennæ not long, subclavate, or somewhat thickened towards apex, the third joint long, longer than 4-5 united. Allanthus, Jurine.

Clypeus truncate; antennæ not long.

♀ Laurentia, Costa.

Anal cell in hind wings as long or a little longer than the submedian; claws cleft.

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